Substance Abuse and HIV in China: The Impact of Residence and Residential Mobility

Xiushi Yang
Old Dominion University

Abstract

Using data from a survey conducted in 2003 and employing multilevel modeling, the paper examines the impact of residential characteristics and mobility on substance abuse and HIV infection in China. Both individual characteristics and contextual factors are hypothesized to affect individual drug using behavior and HIV. The results suggest that being migrant is associated with significantly less risky drug-using behavior and lower odds of HIV infection. Drug use is also significantly associated with being male, less educated, single, and poor psychosocial wellbeing. At the contextual level, drug use is significantly and negatively associated with poverty. HIV infection is significantly correlated with prevalence of drug use in the community. For both drug use and HIV infection, there are significant cross-community variances in the random intercept component, suggesting that the likelihood of substance abuse and HIV infection vary significantly across geographic locations. HIV research and behavioral intervention need to pay particular attention to contextual characteristics.

Introduction

With 650,000 people officially estimated to be living with HIV/AIDS by 2005, AIDS has evolved within two decades from an unheard of disease to an epidemic affecting every population group and geographic location in China (China Ministry of Health, UNAIDS, & WHO, 2006). However, significant differences exist in prevalence of HIV across geographic locations (Gong & Shao, 2001; Zheng, 2001). Although sexual transmission of HIV accounted for 49.8% of new infections in China in 2005, surpassing for the first time that attributable to drug related transmission (48.6%), drug abuse remains a key source of new HIV infections in the country. In 2004, there were more than one million officially registered drug users in China, of whom more than 75% were active heroin addicts (Tang, Zhao, Zhao, & Cubells, 2006). Despite likely serious underreporting, the official statistics make it clear that drug abuse is widespread but varies significantly across geographic locations and different population groups in contemporary China (Fang, Wang, Shi, Liu, & Lu, 2006).

While causes of drug abuse and spread of HIV are likely to be complex and multifaceted, increasing migration has been portrayed by the media and implicated in the literature as one of the main catalyst. In fact, residential *immobility* is arguably the key to understanding the absence of drugs, crimes, and commercial sex in pre-reform China (Situ & Liu, 1996; Troyer, Clark, & Rojek, 1989). Although varied by sources, temporary migrant population, which constitutes the majority of rural-urban migrants in contemporary China, was estimated to have grown from 11 million in 1982 to 79 million in 2000 (Liang & Ma, 2004) and estimated 120 million currently (China Ministry of Health et al., 2006). The uprooting and on the move of so many migrant people may create conditions that are conducive to behavioral change and disease transmission. The quick spread of drugs and HIV in China needs to be understood in the context of social and economic changes associated with increasing migration in the country (Smith & Yang 2005; Weniger & Berkley, 1996).

Much has been written about the economic causes and consequences of migration. Less studied is the impact of migration on substance abuse and HIV in China. Further, the significant spatial difference in prevalence of both drug abuse and HIV underscores the importance of contextual factors in understanding

drug-using behavior and HIV infection. Yet, research on drug abuse and HIV in China has paid little attention to contextual factors that may be conducive to the spread of drugs and consequently HIV. This paper focuses on the impact of migration and residential contexts on drug abuse and HIV infection. The central hypothesis is that the process of migration renders migrants vulnerable to substance abuse and consequently HIV infection and that causes of drug-using behavior and HIV infection go beyond individual level correlates to also include contextual factors at the residential community level. The results will help better understand the impacts of migration on substance abuse and HIV infection and the contextual underpinnings of individual drug-using behaviors and HIV infection. They may also provide important empirical evidence for the design of behavioral or policy intervention programs that target both individuals and social and residential contexts.

Migration, Drugs, and HIV

Studies in China (Anderson, Qingsi, Hua, & Jianfeng, 2003; Li et al., 2004; Smith & Yang, 2005) and elsewhere (Hunt, 1989; Lansky et al., 2000; Organista & Organista, 1997; Skeldon, 2000; UNAIDS, 2001) have repeatedly identified migration as an important factor leading to the spread of HIV/STDs. From an epidemiological point of view, the spread of infectious diseases such as HIV has always been associated with the movement of people. Migration brings more people into close contact and creates a greater mixing of people at places of destination, which provides the ready environment for viral transmissions. Through the movement of infected persons, migration can in turn offer the convenient vehicle to transport diseases to places where they are previously unknown. However, HIV transmission requires more intimate contacts involving the exchange of body fluids. Migration itself will not spread HIV unless it leads to increases in certain HIV risk behaviors among migrants.

Indeed, there is general agreement that migrants are more vulnerable to HIV risk behaviors such as substance abuse and casual/commercial sex than non-migrants (Anderson et al., 2003; Hu, Liu, Li, Stanton, & Chen, 2006; Li et al., 2004; Skeldon, 2000; UNAIDS, 2001; Yang, 2006). A key to understanding migrants' elevated risk behaviors is the potentially reduced social control over individual behavior in the process of migration, which results from migrants' detachment from the usual social and

normative control (Yang, 2006). Being away from home means a breakaway from family care and supervision and detachment from home community and its associated normative control. This creates some sort of social control vacuum whereby migrants feel less constrained by social norms and values since families and friends back home are unlikely to find out what they do while away from home. The power of social sanction embedded in social control (Gibbs, 1982) is thus lost in the process. The transient nature of migrant life and the greater anonymity in places of destination together may render migrants vulnerable to substance abuse.

In addition to lax social control migrants may experience, migrants' peculiar post-migration socioeconomic milieus may also be conducive to risk behaviors (Soskolne & Shtarkshall, 2002; Yang, 2006). Although not all are alike, many migrants are socially and residentially isolated from the "mainstream" society in the place where they live and work. Once arrived in the city, most migrants are concentrated in the margins of the urban economy (Knight, Song, & Jia, 1999; Roberts, 1997; Solinger, 1999; Wang, Zuo, & Ruan 2002) and live with fellow villagers at the place of work or concentrate in transitional neighborhoods characterized by overcrowding, social disintegration, and lack of social and health services (Ma & Xiang, 1998; Zhang, 2001). Migrants' social interaction in the city often does not go beyond that with fellow villagers or migrants. Many migrants, particularly temporary migrants, experience little social or cultural assimilation in the place of destination, feel helpless, insecure, discontented, and resentful, and are prone to substance abuse (Anderson et al., 2003).

Migrants' social and residential isolation in cities may further decrease normative and formal social controls over their behaviors. On the one hand, the neighborhoods (i.e., the fringe areas of the city) where most migrants live are often characterized by lax law enforcement and poor social integration. Such a living environment is not only conducive to drugs, but also where such socially proscribed and HIV risk behavior is more acceptable or tolerated. On the other hand, social and economic marginalization and isolation may make migrants indifferent to social sanctions because the very marginal status makes them feel nothing to lose if their behaviors are detected. Consequently, the combination of lax social control and post-migration social isolation may lead to alcohol and/or drug

dependence among migrants as a way to escape loneliness, bury anxieties about work and family, and cope with stress and frustration associated with social isolation and marginalization (Jochelson, Mothibeli, & Leger, 1991).

Community Contexts, Drugs, and HIV

The importance of social and environmental contexts has long been recognized in studies of public health and health-related behaviors (Diez-Roux, 1998; Duncan, Jones, & Moon, 1993; Oakes, 2004). The literature shows that social and neighborhood conditions are significant factors in explaining the prevalence of HIV risky drug-using behaviors (Crum, Lillie-Blanton, & Anthony, 1996; Galea, Ahern, & Vlahov, 2003; Latkin, Williams, Wang, & Curry, 2005; Wang, Siegal, Falck, & Carlson, 1998;) and HIV (Wallace, Wallace, Andrews, Fullilove, & Fullilove, 1995; Yang, 2005). Community or place social and physical characteristics may affect directly the risk of HIV infection through exposure to the virus or indirectly through drug-using behaviors that increase the risk of HIV infection.

Throughout history, the introduction of new infectious diseases to a community has always been closely related to the community's exposure to the outside world. The introduction and subsequent spread of HIV are no exception. Just as it is true for any infections, exposure to HIV virus is a necessary precondition for HIV infection. In fact, if we were completely free from contacts with others and thereby avoiding any potential exposure to HIV, no HIV infection could have occurred. But life is full of interactions with others in both physical and social environments. In the process, characteristics of the community where we live and work can play an important role in determining the extent of our exposure to HIV (Halloran, 1998).

First, the proportion of residents in a community who are already infected will determine the extent of potential exposure of its residents to existing pool of transmissible HIV/STDs (Ford & Koetsawang, 1991). The intensity of spatial interaction of a community with the outside through migrant network and economic exchange will determine the extent of potential exposure of its residents to new pools of HIV (Wallace et al. 1995; Wood, Chan, Montaner et al., 2000). Second, spatial mobility in and out of a community will create a greater mixing of different at-risk population groups in the community,

which in tern increases residents' exposure to HIV and facilitate the spread of the virus. To the extent that migrants are more vulnerable to HIV while away from home, the return of infected migrants will also bring home the AIDS virus and unknowingly pass it on to their sexual partners (Apostolopoulos et al., 2006; Lau & Thomas 2001; Lurie, Williams, Suma et al., 2003;).

Indirectly, community social and physical characteristics can affect the risk of HIV through influences over residents' drug-using behaviors. Like any other human behavior, drug-using behaviors are not inborn but learned through context specific socialization (Bandura, 1986; Clark, 1987). Individuals learn to behave socially by interpreting images or messages they receive in social interactions or in public domains about what is socially acceptable and by observing and imitating the behavior of others they come into direct or indirect contact. In particular, social norms and networks play an important role in influencing drug-using behaviors (Galea et al., 2003; Latkin et al., 2003). For example, the existence of drug-related cultural, social, and physical scenes in a community can lead to more tolerable perceptions about drugs. The size of drug-using population in a community may facilitate the spread of substance abuse by setting real life examples for others to follow. In essence, drug-using behaviors, like any other human behavior, are unlikely under the complete control by individuals and free from the influence of community social and physical environments.

Community social and physical environments can also affect the local opportunity structure that may influence drug-using behaviors (James, Wagner, & Anthony, 2002; Rhodes et al. 1999; Yang, 2005). Directly, the existence of more drug outlets in a community can lead to easier access to and lower costs of substance abuse (Crum et al., 1996; Galea, Rudenstine, & Vlahov, 2005; Weitzman, Folkman, Folkman, & Wechsler, 2003). Indirectly, the socioeconomic well-being of the community can determine the extent to which its residents are economically marginalized and socially isolated, which in turn influences behavior and affects the opportunity costs of drug-using behaviors (Brewster, Billy, & Grady, 1993; Wilson, 1987). Because substance abuse is socially proscribed and incompatible with socially respectable statuses, indulging in it will likely reduce one's chance of achieving the desirable statuses or may lose them if one has already achieved them. However, if opportunities to achieve desirable statuses are few or

nonexistent, which may particularly be the case in disadvantaged neighborhoods, the opportunity cost of drug-using behaviors will be low, which may be conducive to the spread of drug abuse among residents. Neighborhood disadvantages/disorders are also associated with increased psychosocial stresses, which may lead to greater interpersonal tension and violence and increases in drug abuse as coping and stress reduction mechanisms (Frye et al. 2006; Galea, Freudenberg, & Vlahov, 2005).

Data

Data used in the analysis are from a population-based study of the link between migration and the spread of HIV risk drug-using and sexual behaviors in China, which was funded by the National Institute on Drug Abuse. The study covered an entire province in southwestern China and included both a community and an individual sample survey. The community survey took place in 2001 and covered the entire province. The survey used a special questionnaire to compile annual aggregate information at the township level in rural and neighborhood level in urban places on a wide range of socioeconomic indicators, including numbers of registered drug users, crimes reported, and HIV/AIDS cases. All rural townships and urban neighborhoods were included in the survey. Local administrative office or related agencies were sent the special questionnaire and asked to complete the questionnaire with the requested information for the years between 1996 and 2000.

The individual sample survey took place in 2003. Sample selection followed a three-stage sampling procedure. First, tabulations of known HIV/AIDS cases, drug users, and migrants by counties/cities were prepared with data from the provincial public health and public security agencies and the 1995 mini-census. These tabulations were used to rank all counties/cities, and from the ranked list of counties/cities, eight were selected, giving priority to places with higher concentration of HIV, drug use, and migrant population and geographically representing the province. Second, all rural townships and urban neighbourhoods in each of the eight selected locations were ranked according to estimates of HIV cases, drug users, and temporary migrants, based on existing data from the same government agencies and the 1995 mini-census. From the ranked lists by county/city, five townships and/or neighbourhoods were selected from each. Again, the selection was not random but giving priority to places with a combination

of high prevalence of HIV, drug users, and temporary migrants and geographically representing the varied parts of the county/city. This resulted in a total of 40 townships and neighbourhoods as the primary sampling units (PSUs).

Finally, in each PSU, all individuals 18 to 55 years of age were listed in one of four categories: HIV positive, drug users, temporary migrants, and non-migrants. They were crosschecked for multiple listings. If an individual appeared in more than one category, the individual was reassigned to only one category according to the following priority order: HIV, drug user, migrant, and non-migrant. For example, a migrant who was also a drug user and HIV positive, that individual was retained in the list of HIV positive persons and removed from the lists of migrants and drug users. Therefore, all individuals would appear in one and only one of the four mutually exclusive lists.

In selecting individuals, disproportionate probability sampling (Bilsborrow, Hugo, Oberai, & Zlotnik, 1997) was used to make sure that the resulting sample would contain sufficient numbers of rare populations, e.g., HIV positive and drug users, but not overwhelmed by non-migrants. A target random sample of about 150 individuals from each PSU was planned and distributed as follows: 20 HIV positive, 30 drug users, 40 temporary migrants, and 60 non-migrants. In each category, sample selection started with randomly picking a person from the list and continued selecting at fixed intervals determined by the ratio between the total on the list and the target number for the category. If a list contained fewer than the target number, everyone on the list was selected. Because not every PSU had the target number of subjects in all categories, the actual sample size in a category varied across PSUs.

During the fieldwork, interviewers visited the sampled individuals, explained to them the purpose of the study, their right to refuse, and compensation for their time, and invited them to participate. If the respondent was absent, a second visit was scheduled. If a respondent could not be reached the second time or refused to participate, a replacement was selected randomly from the original sampling list containing the absent or refused respondent unless there was no one left on the list. Participant refusal was low (3.4%). Of the original sample of 5,570, 5,382 individuals consented to participate and completed a face-to-face interview, which took place in private at the respondents' home or if they preferred, a place

away from home. All interviews were conducted in Mandarin or the respondent's dialect if the respondent could not communicate in Mandarin.

Methods and Measures

Given the growing consensus that drug-using behaviors and HIV infections are influenced by both individual and contextual factors, many researchers have argued for multilevel analysis of health behavior and outcomes (Duncan, Jones, & Moon, 1996; Korff, Koepsell, Curry, & Diehr, 1992; Pickett & Pearl, 2001). In the analysis, therefore, data from the community and the individual sample surveys are combined to examine through multilevel modeling both individual and PSU level risk factors of drug abuse and HIV infection. Version 9 of the STATA software is used to conduct the multilevel statistical analyses, which will focus on if and to what extent the individual and contextual variables interact and/or jointly explain participants' drug-using behaviors and HIV status.

The dependent variables are a composite drug-using risk index and the odds/probability of being HIV positive. The composite drug-using risk index is based on five dichotomous variables, indicating whether the respondent ever used illicit drugs, ever shared injection needles, started using drugs under 18 years of age, currently uses drugs, and currently injects drugs. Such a composite index is arguably a better measure than any single dichotomous measure alone (Williams et al., 2001). The higher the index, the higher the HIV risk in terms of drug-using behavior. Cronbach's alpha for the composite index with the survey data is 0.84.

The independent variables include individual and PSU level variables. The key individual variable is migrant status at the time of interview. Migrant is defined as someone who did not possess the official local household registration in the PSU at the time of interview. In addition, a number of individual demographic characteristics and psychosocial wellbeing indicators are included in the multiple regressions to control for differences between migrants and non-migrants, which may confound the impact of migration on drug using and HIV.

Gender, age, and marital status are self-explanatory. Education is a seven-category ordinal variable, ranging from 1 for illiterate to 7 for four years of college or more education. Being male, young,

single, and less educated are all found to be associated with drug abuse in general and risk drug-using behaviors in particular and consequently HIV infection in China (Lai et al., 2000; Tang et al. 2006; Zhou & Li, 1999). Ethnicity is a dummy variable coded 1 for the Han majority and 0 for non-Han ethnic minorities. Being ethnic minority has been found a risk factor for both drug abuse and HIV infection (Choi, Cheung, & Jiang, 2007; Deng et al., 2007).

For psychosocial wellbeing, the analysis focuses on the extent of social isolation and lax social control, measured by two composite scales. For the former, a modified version of the UCLA Loneliness Scale (Russell, 1996) is used. Respondents reported on a four-point scale how lonely they felt on each of 20 statements (e.g., How often do you feel that you lack companionship? How often do you feel left out? How often do you feel that there are people you can talk to); answers to the 20 statements were summed to form the "loneliness" scale. Lax social control is measured by a modified version of the Attitudes toward Authority Scale (Emler, 1999). Respondents reported yes (1) or no (0) on their personal experience with nine events indicating disrespect for laws or use of "deviant" ways to achieve personal ends (e.g., I have carried some kind of weapon in case it was needed in a fight; I have deliberately traveled on a train or a bus without a ticket; I have stolen bicycle(s) from streets). Answers were then summed to create the lax social control scale. For both scales, the higher the score, the more likely the respondent was socially isolated and had behaved in disrespect for laws or deviant ways, indicating lax social control. Cronbach's alphas with the survey data are 0.80 and 0.71 for the loneliness and the lax social control scales, respectively. Both social isolation and lax social control are potential risk factors of drug abuse and HIV infection (Anderson et al., 2003; Deng et al., 2007; Yang, 2006).

For community (PSU) characteristics, urban residence is defined as living in neighborhoods in cities and officially established urban towns. Urban living is typically more stressful and associated with greater anonymity, more liberal behavioral norms, increased diversities in population and social networks, and greater exposure and access to drugs (Frye et al., 2006; Galea et al., 2005; Weiss & McMichael, 2004). These features of urban living are arguably conducive to the spread of substance abuse and sexually transmitted diseases, including HIV. The other four community (PSU) characteristics are all

defined as the means of the respective four official annual statistics (1996-2000) from the community survey. Residential mobility is measured as the mean annual total in and out migrants per thousand working age (15 to 64 years of age) residents in the PSU, indicative of the extent of population mixing in the PSU and its exposure to and interaction with the outside.

Prevalence of drug use in the PSU is measured by the mean annual number of known drug users per thousand working age residents. The presence of more drug users may facilitate the spread of substance abuse by setting real life examples for others to follow and creating more tolerable perceptions about drugs and in turn the spread of HIV (Yang, 2005). PSU level poverty is measured by the mean percent of households living under the government defined poverty line. It indicates the overall economic conditions and socioeconomic inequalities in the PSU.

Finally, prevalence of HIV is measured by the mean ranking based on reported annual numbers of HIV infections at county/city level. Due to confidentiality concerns, the actual numbers of HIV infection were converted into an ordered rank before the data were released. Two steps were used to convert the raw data into ranking. First, annual reported HIV infections were regrouped into an interval distribution. Second, a numeric value was assigned in ascending order starting with 0 to represent each interval in the distribution. The resulting county/city level prevalence ranking of HIV ranges from 0 to 9. In the analysis, the mean annual county ranking is assigned to PSUs within the same county/city, indicating exposure to existing pool of HIV in the PSU (Ford & Koetsawang, 1991).

Results

Table 1 presents the bivariate correlation between the dependent and the independent variables. Different from what is expected, being migrant is negatively associated with drug use and HIV. As expected, being male is positively while being married is negatively associated with risk drug-using behaviors and HIV. Although the respective correlation coefficient is low, age, education, and ethnicity are all significantly correlated with risk drug using and HIV in the expected directions. Both social isolation and lax social control are positively correlated with the two outcome variables. The correlation between lax social control and risk drug using is particularly strong (r=0.54). Lastly, HIV infection is

highly correlated with risk drug-using behaviors, as expected.

(Table 1 about here)

For community characteristics, with the exception of poverty, all others are correlated with drug-using behaviors and HIV infection among residents in the expected directions. Individuals living in an urban place and in a community with higher residential mobility and more drug users and people with HIV/AIDS are associated with higher likelihood of acquiring risk drug-using behaviors or HIV. However, all the coefficients are quantitatively small (r equals 0.1 or lower), suggesting the correlation between these community characteristics and the outcome variables is on the weak side. Different from what is expected, community level poverty is negatively associated with prevalence of risk drug using and HIV. But again, the correlation is quantitatively weak. For a more definitive analysis, we now turn to multivariate and multilevel analysis.

Table 2 presents the multilevel analysis of risk drug using behaviors. When no independent variables are included, results of the random intercept model (Model 1) show highly significant variations (with a standard deviation of 0.255) across PSUs in the estimated constant (intercept), which indicates the mean drug-using risk score in a PSU. This suggests that without considering anything else the place where one lives (i.e., the physical and social contexts) plays an important role in influencing his or her HIV risk drug using behaviors. The control of individual level independent variables in Model 2 reduces the cross-PSU variances in average drug-using behaviors. But the variances (0.044) remain statistically significant, and the intra-PSU correlation has actually strengthened (the coefficient increased from 0.039 in Model 1 to 0.049 in Model 2).

(Table 2 about here)

Among the individual level variables, age and ethnicity lost their statistical significance in the multiple regression analysis, suggesting that the observed bivariate association between age and ethnicity and risk drug-using behaviors (Table 1) may be mediated through other individual level variables. All other individual level variables remained statistically significant. Consistent with the bivariate association, migrants scored significantly lower on the drug-using risk index than comparable non-

migrant residents. Being male, single, and with less education were all associated with more risk drug-using behaviors. Both psychosocial wellbeing indicators were significantly and positively associated with drug using risk, suggesting that people who were socially isolated and had experiences of disrespect for laws or social norms were more likely to also have risk drug-using behaviors.

When individual and community characteristics were examined together (Model 3), the coefficient estimates for all individual level variables hardly changed. This indicates that the associations between individual demographic and social attributes and drug-using behaviors are largely independent of community characteristics. Of the four PSU characteristics, only poverty level remained significant. In contrary to what would be expected, PSU level poverty was associated with a lower prevalence of risk drug-using behaviors. In other words, residents in communities with higher poverty level were significantly less likely to have risk drug-using behaviors.

While both the random intercept variances and the intra-PSU correlation were more than halved in Model 3, they (0.021 and 0.024, respectively) remained statistically significant. It appeared that through whatever mechanisms and in addition to poverty and the other PSU characteristics included in the analysis the social and physical environments of residence in general exerted significant influence over residents' risk drug-using behaviors.

For the risk of HIV, results in Table 3 again suggest the importance of residential social and physical environments. For example, when no individual or PSU level correlates were included (Model 1), the average odds of being infected with HIV varied significantly across PSUs. This, along with the sizable intra-PSU correlation (0.241), indicates that like drug-using behaviors the odds of being HIV positive were spatially significantly correlated with where one lived.

(Table 3 about here)

Both the cross-PSU variances and the intra-PSU correlation were considerably reduced once the individual level variables were included in the analysis (Model 2). But the average odds of HIV infection remained significantly varied across PSUs. Among the individual level correlates, being migrant was correlated with significantly lower odds of being HIV positive. In fact, for a migrant, his/her odds of

being infected with the AIDS virus were less than 25% (OR=0.246) of that of a comparable non-migrant resident. This was particularly striking in light of the fact that the drug-using risk, a significant risk factor of HIV, had already been controlled for in the analysis.

Consistent with the literature and the earlier bivariate correlation analysis, males had significantly higher odds of being infected with HIV than comparable females. Risk drug-using behavior was the only other individual level variable that remained statistically significant in Model 2. As expected, drug abuse was a significant and powerful risk factor of HIV infection. Other things being equal, each drug-using behavior displayed by respondents (i.e., increase of one unit in the composite drug-using risk index) would more than doubled the odds of HIV infection.

The coefficient estimates for individual level correlates remained mainly unchanged when PSU level characteristics were controlled for in Model 3. Of the five PSU characteristics, only the prevalence of drug use remained statistically a significant risk factor of HIV infection. None of the others, not even the prevalence of HIV in the PSU, was significantly correlated with the odds of being HIV positive. Considering that most of the PSU characteristics were significantly correlated with HIV infection at the bivariate level (Table 1), the results suggest that residential influences may be mediated by individual level variables, particularly risk drug-using behaviors. The fact that the cross-PSU variances and the intra-PSU correlation remained statistically significant, although further reduced in Model 3, suggests that contextual factors other than those included in the analysis may be important mediators between residential contexts and the likelihood of being infected with HIV.

Discussion and Conclusions

Within two decades, AIDS has evolved from a perceived disease of foreigners to an epidemic affecting every geographic location in China. Drug abuse has been and remains to be a key contributing factor in the AIDS epidemic. In search for answers, both the media and the literature have often blamed the increasing migration for the spread of drugs and HIV in China. While migrants may well be more vulnerable to drug abuse and HIV, little research in China has actually compared migrants with comparable non-migrant residents in the likelihood of drug abuse and/or HIV infection. Further, despite

the fact that prevalence of drug abuse and HIV vary significantly across geographic locations, research on drug abuse and HIV in China has rarely incorporated attention to community social and physical contexts. This paper tries to fill some of the void. Using data from a population-based survey that included both migrants and non-migrants and applying multilevel modeling technique, the paper focuses on the impact of migration and residential contexts on drug abuse and HIV, emphasizing both individual and contextual risk factors.

The results suggest that being migrant is associated with significantly less HIV risk drug-using behavior and lower odds of being infected with HIV. This appears to contradict the often-negative image about migrants portrayed by the media and in the literature. It is also inconsistent with previous findings using the same data but based on single drug use indicators and without incorporating contextual factors in multilevel modeling (Yang, 2006; Yang, Derlega, & Luo, 2007). Differences in measurement (single vs. composite drug using indicator) and model specifications (single vs. multilevel modeling) may help to account for the discrepancy. More importantly, data limitations may have introduced biases that underestimate drug use and HIV among migrants. For example, the survey used official drug user and HIV registries as the sampling frameworks. This would have over sampled non-migrant residents because except for newly reported cases these registries were compiled based on local household registrations. Migrants would not appear on the registries (they would on the registries in their places of origin) because by definition they did not have the local registration at the time of the survey.

Although the survey questionnaire contained detailed questions on drug use and HIV, which would allow migrants to reveal their drug use and HIV status if they had answered the questions accurately, it would unlikely have fully corrected the potential underestimate of drug use and HIV among migrants. Future research on migration and drug use/HIV in China needs to develop innovative sampling techniques that can produce probability samples of drug users and people living with HIV/AIDS among both migrants and non-migrants. This will be methodologically challenging but necessary in order to obtain unbiased samples by migrant status, which are in turn necessary for comparative analysis of drug abuse and risk of HIV by migrant status. Until a link between migration and drug abuse/HIV can be

reliably established, it appears fair to conclude that other things being equal migrants are not necessarily or always more vulnerable to drug abuse and HIV as a result of risk drug-using behaviors.

Consistent with previous findings, being male, single, and with less education are all correlated with more risk drug-using behaviors, so are social isolation and lax social control. But being ethnic minority is not significantly associated with risk drug-using behaviors. None of the demographic characteristics appear to be important correlates of HIV infection, of which the only consistent risk factor is drug-using behavior. The lack of significance of ethnicity confirms that both drug and HIV epidemics in China are no longer limited to ethnic minority populations, as they were earlier in the epidemics.

With the only exception of poverty level, the community characteristics as measured have no significant and independent impact on individual drug-using behaviors in the multiple and multilevel analysis. Different from the common belief in China that drugs are mainly a problem in poor rural areas, drug abuse is found in this study very much an urban problem and is not likely the result of poverty. Similarly, prevalence of drug use in the community is the only community level risk factor of HIV that remains statistically significant once individual and community characteristics are examined together in the multilevel model. For both drug using behavior and HIV, the control of community characteristics considerably reduces the random intercept variances and the intra-PSU correlations, suggesting that these PSU characteristics do exert important influence over individual drug-using behaviors and HIV risk. However, the influence of most community characteristics may not be direct but mediated through individual level factors.

The most consistent finding of the study is that individual drug-using behavior and HIV risk are significantly influenced by residential contexts. More research seeking to identify the contextual risk factors is needed for both theoretical understanding of the links between residential contexts and substance abuse and/or HIV and for effective policy prescriptions to moderate the negative impact of social and physical environments. Future studies of drug using behaviors and HIV risk in China must pay attention to contextual influences and try to understand mechanisms through which community context influence individual behavior. Policy and program interventions to reduce risk drug-using behaviors must

address contextual risk factors.

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Table 1. Bivariate Correlation between Risk Drug-Using Behavior and HIV infection and Individual and Community Level Characteristics

Independent Variables	Sample Size	Dependent Variables	
		Drug-using Risk Index	HIV/AIDS
Individual level:			
Being migrant	5,382	-0.2804**	-0.1537**
Being male	5,355	0.3082**	0.1503**
Age	5,371	-0.0975**	-0.0309*
Being married	5,376	-0.3696**	-0.1806**
Education[a]	5,372	-0.0551**	-0.0273*
Ethnic Han majority	5,351	-0.0360**	-0.0462**
Loneliness	5,382	0.3475**	0.1710**
Lax social control	5,382	0.5390**	0.2925**
Drug-using risk index	5,382	/	0.4556**
Community (PSU) level:			
Urban residence	5,382	0.0745**	0.0589**
Prevalence of drug use[b]	4,768	0.0521**	0.1010**
Total migrants[b]	5,382	0.0598**	0.0195
Poverty level[c]	5,382	-0.1138**	-0.0611**
Prevalence of HIV[d]	5,382	0.0315*	0.0692**

Notes:

[a] Education is an ordinal variable: 1 illiterate or semi-illiterate; 2 elementary school; 3 junior high school; 4 senior high school; 5 vocational school; 6 two/three years college; and 7 four years college or more.

[b] Measured as per thousand working age resident population.

[c] Measured as percent of households under government established poverty line.

[d] Composite rank ranges from 0 (low) to 9 (high).

* $p < 0.05$; ** $p < 0.01$

Table 2. Multiple Linear Regression Analysis of Individual and Community Risk Factors of HIV Risk Drug-Using Behaviors[a]

Independent Variables[b]	HIV Risk Drug-Using Index		
	Model 1	Model2	Model 1
Individual level:			
Migrant		-0.644**	-0.697**
Male		0.440**	0.438**
Age		-0.001	-0.001
Married		-0.590**	-0.618**
Education[c]		-0.092**	-0.106**
Han majority		-0.002	-0.002
Loneliness		0.030**	0.031**
Lax social control		0.339**	0.334**
PSU level:			
Urban		/	0.083
Prevalence of drug use[d]		/	0.002
Total migrants[d]		/	0.001
Poverty level[e]		/	-0.007**
Prevalence of HIV[f]		/	/
Random intercept	0.665**	-0.223*	-0.276*
Sample size	5,382	5,249	4,654
Random intercept variances	0.065**	0.044**	0.021**
Intra-PSU correlation	0.039	0.049	0.024

Notes:

[a] Results are maximum likelihood estimates based on the "xtmixed" model for continuous dependent variable in STATA software.

[b] The reference categories for variables of migrant, male, married, Han majority, and urban are non migrant, female, single, ethnic minority, and rural respectively.

[c, d, e, f] See notes a, b, c, d, respectively, in Table 1.

* p <0.05; ** p <0.01

Table 3. Multiple Logistic Regression Analysis of Individual and Community Risk Factors of the Odds of Being Infected with HIV[a]

Independent Variables[b]	Odds of Being Infected with HIV		
	Model 1	Model2	Model 1
Individual level:			
Migrant		0.246**	0.214**
Male		1.685*	1.530
Age		1.013	1.011
Married		0.772	0.711*
Education[c]		0.991	0.988
Han majority		0.766	0.793
Risk drug-using index		2.508**	2.467**
PSU level:			
Urban		/	1.793
Prevalence of drug use[d]		/	1.019*
Total migrants[d]		/	0.996
Poverty level[e]		/	0.986
Prevalence of HIV[f]		/	1.117
Random intercept	0.045**	0.008**	0.004**
Sample size	5,382	5,249	4,654
Random intercept variances	1.043**	0.694**	0.491**
Intra-PSU correlation	0.241	0.174	0.130

Notes:

[a] Results are based on the "gllamm" model in STATA software and expressed as the odds ratios associated with corresponding one unit change in the independent variables.

[b] The reference categories for variables of migrant, male, married, Han majority, and urban are non migrant, female, single, ethnic minority, and rural respectively.

[c, d, e, f] See notes a, b, c, d, respectively, in Table 1.

* p <0.05; ** p <0.01