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Population Mobility High-Risk Environments and the Diffusion of HIV/STDS: A Community Based Study in Southwest China

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POPULATION MOBILITY, HIGH-RISK ENVIRONMENTS AND THE DIFFUSION OF HIV/STDS:

A COMMUNITY BASED STUDY IN SOUTHWEST CHINA

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ABSTRACT

POPULATION MOBILITY, HIGH-RISK ENVIRONMENTS AND THE DIFFUSION OF HIV/STDS:
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Globally, population migration has been associated with the spread of HIV/STDs in many countries. A similar trend has been observed in China from the very beginning of the HIV epidemic, but empirical research is very limited. Furthermore, the previous studies mainly focused on the micro impact of migration on individual migrant's risky behaviors. The impact of population mobility on the general population, especially on non-migrant residents, has been ignored. Using data collected from a specially designed community level survey, which was conducted in a province in the Southwest of China, this study examines the macro-level association between temporary migration and the diffusion of HIV/STDs. It focuses on the contextual environments, which are associated with the spread of HIV/STDs among the general population including non-migrant residents. This study was designed to address the following research questions: Is temporary migration associated with the levels of drug abuse and commercial sex in a community? Are the levels of drug abuse and commercial sex associated with the prevalence of HIV/STDs in a community? Is temporary migration associated with the prevalence of HIV/STDs in a community? Is temporary migration associated with the prevalence of HIV among non-migrant residents in a community?

Analyses reveal some important findings: First, the proportion of temporary migrants in China is positively correlated with the prevalence of drug abuse and the

prevalence of commercial sex. Second, the prevalence of drug abuse and the prevalence of commercial sex are positively associated with the prevalence of HIV/STDs. Third, there is a significant and positive relationship between the level of temporary migration and the prevalence of HIV/STDs in a community, and the prevalence of HIV among non-migrant residents. Implications and directions for future research are discussed.

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CHAPTER I

INTRODUCTION

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) have become one of the most devastating epidemics human kind has ever faced (Centers for Disease Control and Prevention 2001). In less than two decades after HIV was first identified, the virus has appeared in every region in the world and posed one of the greatest challenges to all human beings. It has generated a global epidemic far more extensive than what was predicted even a decade ago (Gardiner 2002).

HIV/AIDS appeared in China later than in most of the other countries in the world because of China's limited contacts with other countries, the government's strict enforcement of anti-drug and anti-prostitution laws, and culturally conservative attitudes about sex in general (Normile 2000). However, the epidemic is currently rapidly spreading in this area. The first case of AIDS in China was diagnosed in 1985 in Yunnan province in the Southwest of China (Yu et al. 1996). By 2000, HIV infection has been detected in each of the 31 provinces, autonomous regions or municipalities in China, with no place untouched (Abdullah 2002). The number of reported cases rose by 67.4 percent nationwide in the first half of 2001 over the same period the previous year (Stephenson 2001). According to official statistics in 2001, the number of confirmed HIV infections and AIDs were only 30,373 and 1,594 respectively (Xinhua News Agency 2001). However, it is generally agreed that they are seriously underreported due to insufficient surveillance and poor reporting mechanisms (Joint United Nations Programme on HIV

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and AIDS 2002). The latest report from the Chinese Ministry of Public Health revealed that the actual number of cases currently had reached one million for HIV infection (People's Daily 2002). Moreover, the localized epidemic in some areas, such as Yunnan, Guizhou in the Southwest and Xingjiang province in the West, is on the brink of spilling into the general population (Rhodes et al. 1999a; Abdullah 2002). HIV is a new manifestation of an historic problem—an epidemic of sexually transmitted diseases (STDs). High prevalence of STDs is an indication of the potential extent of HIV transmission (Jochelson, Mothibeli, and Leger 1991; Chen et al. 2000). Over 859,000 cases of STDs have been detected in China in 2000 alone, which will further speed the epidemic of HIV (Gong et al. 2001). All the evidence shows that China is on the verge of a catastrophe (Fang 2001).

Given the rapid spread of HIV/STDs and the large population of China, what caused the devastating epidemic is clearly a critical issue. As in South Africa and other Asian countries, temporary migration in China has been frequently blamed as one of the main causes for the rapid diffusion of HIV/STD infection (Rhodes et al. 1999a; Zhang and Ma 2002). Nevertheless, little systematic research has been performed to investigate the relationship. This study attempts to fill this void by examining the macro-level association between population mobility and the spread of HIV/STDs in China.

POPULATION MOBILITY AND THE SPREAD OF HIV/STD INFECTION

Population mobility is a central theme in the discussion of any infectious diseases in modern society including HIV/STDs (Hunt 1989; William et al. 1993; Decosas et al. 1995; Sircar and Tewari 1996; Mishra, Ross and Raul 1996; Organista and Organista

1997; Herdt 1997; Stimson 1997; Brockerhoff and Biddlecom 1999; Skeldon 2000; Yang 2002a). Conventional epidemiological interpretations regard migration as a virus carrier and population mixer (Caldwell, Anarfi and Caldwell 1997). Like any other infection, the spread of HIV/STDs follows the movement of people. Migration provides a ready environment for the spread of infection by bringing more people into close contact and creating greater mixing of people in the place of destination or the place during their transit. The increasing internal and international migration facilitated by the growth of modern transportation and communication breeds the prime condition for transmission of HIV/STDs throughout the world.

Furthermore, from social and behavioral perspectives, the impact of population mobility on the vulnerability of migrants to HIV/STDs has been delineated (Brockerhoff and Biddlecom 1999; Yang 2002a). As the transmission of HIV requires direct and personal contact involving the exchange of bodily fluid, such as sexual contact, at the individual level, being mobile itself is not a risk factor for HIV/STDs. Rather, the situations encountered and the behaviors possibly engaged in are what increase the threat of HIV/STDs to migrants (Joint United Nations Programme on HIV and AIDS 2001). Migrants' frequent and lengthy absences from their homes disrupt their familiar and stable sexual relationship. In a lonely and hostile environment and being separated for a long period from their regular sexual partners, some migrants may engage in particular risky behaviors, such as unprotected sex with multiple sexual partners or needle sharing in injecting drugs. The new situation that migrants encounter in places of destination increases the probability of practicing those risky behaviors. Therefore, the dislocation of family or individuals from their households and communities resulting from mobility

generally leads to an increase in susceptibility and vulnerability to HIV/STD infection (Guinness and Kumaranayake 2002).

Moreover, it is increasingly recognized that HIV infection has gone beyond certain "risky individuals" who practice certain "risky behaviors" to the general population, especially as unprotected heterosexual contact becomes an important means of transmission (Parker 1996). High-risk situations, which may be brought about by population mobility, do not affect only migrants' groups but also the local people (Shtarkshall and Soskolne 2000; Hsu 2001). Therefore, it is important to assess the impact of population mobility on migrants themselves as well as on the general population. Identifying high-risk situations and high-risk environments rather than the risky groups or risky behaviors might better address the social conditions behind the epidemic spread of HIV/STDs. The environmental factors are greatly responsible for the spread of HIV/STD infection, as they influence the personal decision and the likelihood of certain behaviors (Brewster, Billy and Grady 1993; Yang 2002c). An understanding of the environments in which certain behaviors occur is essential to effective public health and HIV/STD prevention.

The HIV/STD epidemic is increasingly intertwined with social and economic situations in contemporary societies. In response to the changing face of the HIV/STDs epidemic, more and more studies are focusing on the macro contextual factors, which may create the pre-conditions for the rapid diffusion of HIV/STDs (Zwi and Cabral 1991; Rhodes et al. 1999a; Atlani et al. 2000; Hien et al. 2000; Wang and Gao 2000). However, the impact of population migration on macro-social contexts, which may result in the further spread of HIV/STDs to the general population, is still under researched.

Population mobility and HIV/STDs are two crucial global phenomena in the new millennium. The repercussion of the HIV/STD epidemic has engendered both concern and speculation among the health sectors as well as social science researchers. Given the increasingly large number of mobile people and the seriousness of the HIV/STD epidemics, there is an urgent need for concerted responses that address the particular contextual factors associated with HIV/STDs.

STATEMENT OF THE RESEARCH QUESTION

Though the association between population mobility and the spread of HIV/AIDS has been frequently implicated, the association in China has seldom been empirically examined. Furthermore, previous studies have only suggested the impact of migration on individual migrants' vulnerability to HIV/STDs; the impact of migration on non-migrant residents has been largely overlooked. This study attempts to focus on the association between population migration and the spread of HIV/STDs at the macro level. The theme is that population mobility is not only responsible for the increased risk of migrants to HIV/STDs, but also an important facilitator in the spread of HIV/STDs to the general population by creating high-risk environments, specifically in this study the prevalence of drug abuse and commercial sex. From a broader contextual perspective, the "high-risk environment" conceptualized in this study shapes the present trend of the HIV epidemic. By investigating macro level high-risk environments rather than simply focusing on individual risk behaviors, a better understanding of the dynamics of HIV/STD transmission can be achieved.

The aim of this research is to assess the macro impact of temporary migration on

the prevalence of HIV/STDs. Specifically, this research is designed to answer the following questions:

1 Is temporary migration associated with the levels of drug abuse and commercial sex in a community?

2 Are the levels of drug abuse and commercial sex associated with the prevalence of HIV/STDs in a community?

3 Is temporary migration associated with the prevalence of HIV/STDs in a community?

4 Is temporary migration associated with the prevalence of HIV among non-migrant residents in a community?

RESEARCH SETTING

In this research, the connection between population mobility and the spread of HIV/STDs at the macro level will be examined. The data used in this research were collected in 2001 as part of a large-scale on going research project conducted in a province in the Southwest China, which shares a long border with Thailand, Lao, Myanmar and Vietnam - countries also faced with serious HIV/AIDS epidemics (Lyttleton and Amarapibal 2002).

For the past couple of decades, there has been an increasing cross-country migration in this province with the opening of borders and the increase in cross-broader trade (Chantavanich 2000). The beautiful natural scenery and the multiethnic background in this province also make it a major tourist destination for both domestic and international tourists. Perhaps as a consequence of increased mobility both within and

across the broader, commercial sex trade is booming in this province, which is usually disguised as personal services and entertainment activities provided in massage parlors, nightclubs, Karaoke bars, and hair salons (Chantavanich 2000).

Because of its geographic proximity to the "Golden Triangle" - one of the biggest drug production and distribution centers in the world, where twenty percent of the world's opium supply used to process heroin is produced - the location serves as both the primary illicit drug market and often the first leg of drug trafficking in China (Yu et al. 1996). Illicit drug use has been rampant in this southwestern province since the late 1980s (Xia, Kreiss and Holmes 1994), and about eighty percent of China's illegal drugs pass through this area (Zhang and Ma 2002).

In addition, the province has been the epicenter of HIV/AIDS in China (Fang 2001). Tracing the main source of the epidemic in China, every strain of HIV is originated in this area (Fang 2001). The earliest cases of HIV/AIDS were detected in this region, which continues to have the highest concentration of HIVAIDS cases in China at the present time (Zhang and Ma 2002). Since 1994, HIV infection rates in this province have more than doubled each year (Stephenson 2001). Up to the mid-1990s, more than 80 percent of the China's reported AIDS cases were located in this region (Fang 2001).

Similar to other provinces in China, government agencies, namely, the health and the public security bureaus are responsible for keeping records of the detained drug users, prostitutes and known HIV/STD cases. Although probably incomplete, the government records can greatly ease the difficulty in identifying those hard to reach target populations.

VALUE OF THE STUDY

The study of the connection between population migration and HIV/STDs has both theoretical and practical significance. First, this research will provide a detailed description of the relationships between population migration, drug abuse, commercial sex, and HIV infections at the community level. The findings are expected to support our understanding of the spread of HIV/STDs in China. They could also provide empirical evidence on whether migration is indeed a contributing factor to HIV/STDs prevalence.

Second, previous studies of the impact of population mobility largely focused on the risk behavior that leads to individual migrant's vulnerability to HIV/STD infection. This study, however, focuses on the contextual environments - specifically the prevalence of drug abuse and commercial sex - that may facilitate the spread of HIV/STDs among the general population of non-migrant residents. The findings can therefore provide a better and more complete understanding of the impact of population mobility on the spread of HIV/STDs in China.

Third, the findings from this research will be of great significance in developing effective community-based preventive programs toward halting the epidemic in China. Frightening evidence has shown that HIV/STDs would be pandemic in China if there were no effective measures taken to fight against the spread of HIV/STDs (Fang 2001). Community-based preventive actions have been strongly advocated to halt the epidemic spread of HIV/STD infection (Altman 2001; Hobfoil 1998; Scott and Rosko 1999; Reppucci, Woolard and Fried 1999). Because of this study's contextual focus, its findings will aid government at all levels in designing and executing better policies and programs in HIV/STDs prevention, social services, and crime prevention.

PLAN OF THE STUDY

This thesis consists of five chapters. Chapter two provides a review of the literature. It includes four sub-sections: (1) Population mobility in China; (2) HIV/STDs and the risks in China; (3) Previous research on the link between population mobility and HIV/STDs with a focus on contextual risk environments; (4) the conceptual framework and the hypotheses of this study. Chapter three discusses the methodology of the study, including the sample, the variables and their measurements, data manipulation and the techniques of analysis used in this study. The limitations of the study are also discussed in this part. Chapter four interprets the result of data analysis. Chapter five elaborates the findings in the study; the implications and directions for future research are also presented here.

CHAPTER II

REVIEW OF THE LITERATURE

The relationship between population mobility and the spread of HIV/STDs has been frequently discussed in literature (Hunt 1989; William et al. 1993; Obbo 1993; Decosas et al. 1995; Sircar and Tewari 1996; Mishra et al. 1996; Organista and Organista 1997; Herdt 1997; Stimson 1997; Brockerhoff and Biddlecom 1999; Skeldon 2000; Yang 2002a, 2002b), but empirical research is still rarely found, especially in China. Previous studies have documented the link between population mobility and individual migrants' vulnerability to HIV/STD infection (Brockerhoff and Biddlecom 1999; Skeldon 2000; Yang 2002a). However, with the changing face of the epidemic, identifying migrants' risk behaviors alone is not sufficient to explain the present trend of HIV/STD transmission. Population mobility may also create high-risk situations or high-risk environments, which are pre-conditions for the spread of HIV/STDs to the general population (Zwi and Cabral 1991; Ford and Koetswang 1991; Rhodes et al. 1999a; Rhodes et al. 1999b; Atlani et al. 2000).

This literature review consists of four sections. The first section discusses population mobility in China, its background and present situation. The second section examines HIV/STDs in China and its associated risks, in particular drug use and commercial sex. The third section describes current research on population mobility and HIV/STD vulnerability with a focus on contextual environments. The fourth section discusses the conceptual framework and lists the hypotheses of the study.

POPULATION MOBILITY IN CHINA

Population migration in China was rare before the 1980s because of the strict control of the government household registration system (Yang and Goldstein 1990; Goldstein and Goldstein 1991; Goldstein, Goldstein and Guo 1991; Yang 1994, 1996; Yang and Guo 1999; Liang 2001; Feng, Zuo and Ruan 2002). However, in response to social and economic changes during the market reform period after 1978, a vast number of people began moving across the country in search of employment opportunities and better social status (Liang 2001; Feng et al. 2002). The dominant form of migration currently is the temporary migration from rural to urban areas. The number of temporary migrants was reported to be around 80 to 100 million at any point in time, accounting for up to eight percent of China's total population (Liang 2001). Such an unprecedented population shift has not only generated economic issues, but also raised various social problems, such as crowding in the urban areas, increasing crime rates, and the spread of infectious diseases (Tong 1995; Smith 1996; Fan 1999; Hare 1999; Solinger 1995, 1996), among which HIV/STDs is becoming one of the greatest concerns in Chinese society (Liao et al. 1997; Rhodes et al. 1999a; Yang 2002a, 2002b; Bandyopadhhyay and Thomas 2002).

Household registration has been a major government policy in controlling population migration since the 1950s (Yang and Goldstein 1990; Goldstein and Goldstein 1991; Goldstein, Goldstein and Guo 1991). In China, everyone is born with one of two types of official household registration, either agricultural or nonagricultural, which determines where one could live and which public benefits one could be entitled (Yang 1993; Yang and Guo 1999; Liang 2001). The government tightly controlled population

migration by the use of residence registration, grain rationing, job allocation and housing control in the pre-reform period (Yang 1993; Cheng and Selden 1994). Any individual who wanted to migrate had to obtain permission from the local authorities in the place of origin and in the place of destination; otherwise one could not obtain employment and social services in the place of destinations. While the government literally controlled all kinds of residential mobility, transition from agricultural to nonagricultural status was particularly difficult (Liang and White 1996; Hare 1999).

The rapid market transition, which has occurred since 1978, has significantly undermined the role of the Chinese household registration system in regulating migration (Roberts 1997). The unprecedented large-scale rural to urban migration is both a spontaneous response to, and a consequence of, the social and economic reform (Yang 1993). The difference in levels of social and economic development and income disparity between rural and urban areas is the root cause of the large-scale population migration in China. On the one hand, increasing rural productivity decreased the need for rural labor. On the other hand, there was a growing demand for labor in construction work, household services, retail and food services as well as other personal services, which urban residents were unwilling or unable to do. Therefore, the hiring of rural migrants was officially endorsed under certain regulations (Yang and Guo 1996, 1999; Hare 1999). Furthermore, the proliferation of urban free markets made it possible for temporary migrants to live in the city even without the official urban household registration (Yang and Guo 1999). Pushed by the rising agricultural productivity and pulled by the increasing demand for industrial products and services, large numbers of peasants are now flocking to cities and towns (Chai and Chai 1997; Hare 1999).

Underlying the unprecedented population mobility in contemporary China is the unique distinction between permanent and temporary migrants (Goldstein and Goldstein 1991). The former are defined as migrants who have obtained permanent household registration in the place of destination. The latter are composed of migrants who do not have an official household registration in the place of destination and therefore are considered officially residents of their places of origin, regardless of how long they may have stayed in the place of destination (Goldstein, Goldstein and Guo 1991). They are termed temporary migrants (Goldstein and Goldstein 1991;Yang 1993), illegal migrants (Wu 1994), circulatory migrants (Woon 1993), or floating population (Chai and Chai 1997). In this study, specific attention is given to this type of temporary migrants. In contrast to permanent residents, temporary migrants are not eligible for government subsidized housing, health insurance, medical care and state employment to which permanents residents are entitled (Roberts 1997). Overall, temporary migrants maintain a high degree of attachment to their original rural communities and households by remitting portions of their earnings and returning home regularly (Goldstein, Goldstein and Guo 1991; Hare 1999).

Being extremely marginalized from the mainstream society, the situation of temporary migrants is somewhat similar to that of the undocumented Mexican migrants in the United States (Roberts 1997). They are mostly in their sexually most active ages (18-45), among whom males account for 55 percent and females 45 percent (Peng and Guo 2000). Their overall education level is quite low. One survey conducted in Shanghai showed that among the migrant population, 9.4 percent were illiterate. Only 24 percent and 47.6 percent had had primary and junior high school education, respectively

(Peng and Guo 2000). They maintain a "rural" identity, and their occupations and living environments are also distinctively different from those of urban residents (Solinger 1996; Yang and Guo 1996; Knight and Song 1998). They are more likely to engage in intensive labor, low skilled and potentially hazardous jobs in cities (Cheng and Selden 1994), while their access to basic benefits such as medical care, labor insurance and old age pension is almost non-existent. The lack of official residence registration often makes them vulnerable to mistreatment and discrimination, therefore more susceptible to abuse by law enforcement personnel (Yang and Guo 1999).

Such a large and unprecedented flow of migrants has not only generated new economic dynamics, but has also brought about a considerable number of social problems (Yang 1993; Woon 1993; Kuhn and Keye 1994; Tong 1995; Yang and Guo 1996; Chai and Chai 1997). Migrants from rural areas provide a major labor source for the basic production and service industry in the urban areas and contribute greatly to the development of the urban economy. The transient nature of their residency, however, blurs lines of jurisdiction over them between the village and city authorities. When population density strains the capacity of cities, many problems may arise, while any control attempted by city authorities would be difficult (Kuhn and Keye 1994). Therefore, the presence of temporary migrants has also been associated with a decline in social order and increasing crimes (Tong 1995).

For example, research has found that the transient population is a high-risk group for various deviant behaviors, such as alcoholism, gambling, burglary, drug use, prostitution, and drug trafficking (Woon 1993; Kuhn and Kaye 1994; Yang 1993; Situ and Liu 1996). According to the statistics from the Administrators of Public Security,

forty-four percent of the crimes solved by the police in Beijing in 1994 were committed by temporary migrants. In Shanghai, the rate of crime among migrants had been rising from 10 percent in the mid-1980s to 60 percent and even as high as 80 percent in some districts (Situ and Liu 1996).

More recently, the epidemiological role of mobility brought the temporary migrant population into our focus in the era of AIDS (Bandyopadhhyay and Thomas 2002; Shelton 2001). Temporary migrants are identified as high-risk groups in high-risk situations for HIV/STD infection (Hunt 1989; Parker 1997; Yang 2002a). Being away from home for an extended period of time, many male migrants often have difficulties in managing time after long working hours. Free from control of the home environment and largely outside of the social control mechanisms in the new environment, they may be more likely to engage in casual sex or illicit drug use in order to vent their frustrations (Chantavanich 2000). Female migrants, being poorly educated and without job skills, have greater difficulties than their male counterparts in finding stable employment and consequently, end up working in entertainment establishments, such as barbershops, hotels, karaoke bars, video parlors, and movie theaters, all of which often serve as the fronts for commercial sexual services (Archavantikul and Guest 1994; Qu et al. 2002). By the nature of their sex-related work, female migrants working in entertainment establishments are generally highly susceptible to HIV/STD infection. The unstable employment and difficulties in surviving in the cities may also force some migrants to seek the quick money of the sex trade or in drug trafficking.

It is therefore argued that increasing temporary migration may be a direct cause of the return of social vices in China, such as illicit drug use and prostitution (Situ and Liu

1996; Walsh-Childrens et al. 1997; Ren 1999). According to a police report in Guangdong province on China's southern coast, the higher the percentage of temporary migrants in a city, the greater the number of arrests of prostitutes in that city, many of whom were, themselves, temporary migrants (Ren 1999). In 1994, ninety percent of prostitutes and drug traffickers in Guangdong were temporary migrants (Situ and Liu 1996). In Kunming, the capital of Yunnan, among the 1,125 individuals who were involved in the 908 drug trafficking cases in 1997, 858 were temporary migrants (Yang 1999). During the first ten month in 1998, seventy percent of the 8,339 arrested drug abusers were found among temporary migrants (Yang 1999). Thus there is evidence that increasing temporary migration is a contributing factor in the return of these social vices, which are the main catalyst in the quick spread of HIV/STDs in contemporary China (Yang 2002a).

HIV/STDs AND THE RISKS IN CHINA

HIV/AIDS was first detected among homosexual groups in western countries. In China, however, sharing of needles when injecting drugs was the major cause of HIV transmission in the beginning of the epidemic (Xia et al. 1994; Wang et al. 1998; Rhodes et al. 1999a). While shared needles remain the predominant route of HIV transmission with more than 70 percent of the infection being detected among injecting drug users (Xia et al. 1994; Zhang et al. 2002), the number of the reported infections through heterosexual transmission has increased steadily to account for 7 percent of the total known HIV cases (Zhang and Ma 2002). The booming commercial sex is considered to be responsible for the rapid increase of heterosexual transmission (Fleming and

Wasserheit 1999; Anneke et al. 2001). Moreover, drug use and commercial sex are often intertwined, with each being likely the re-enforcer of the other (Cottler, Helzer and Tipp 1990, Bassel and Schilling 1991; Qu et al. 2002).

Drug use and HIV/AIDS

Though drug use has been strictly banned in China, heroin addiction surfaced in the early 1980s, bolstered by the "open door" policy and the reemerging drug trafficking through southwest China (Xia et al. 1994). The region neighbors the "Golden Triangle" - one of the biggest drug production and distribution centers in the world (Yu et al. 1996). Presently drug use is spreading eastward throughout the southwest provinces and beyond to the whole country (Fang 2001). Data from the National Narcotics Control Commission showed that there were 681,000 drug users registered by the Public Security Bureau in China in 1999 (Information Office of the State Council of People's Republic of China 2000). In the year 2000, 96,180 drug users were identified, (up by 49 percent from 1999) of whom 60 percent were injecting drug users (IDUs). Thirty percent of IDUs had shared needles with others (Zhang and Ma 2002).

The Ministry of Public Security requires that every drug user be registered and undergo a detoxification program while incarcerated for three to six months, as a drug user is often seen as having a "moral problem" that should be cured by lectures on law and morality in a milieu of compulsory rehabilitation (United Nations Theme Group 2002). In 2000, China had a total of 746 rehabilitation centers and 160 rehabilitation-through-labor centers (United Nations Theme Group 2002). These rehabilitation centers focus mainly on detoxification and moral/legal education. However, the program is not

very successful since the relapse rate is as high as 90 percent over the past five years (Zhang and Ma 2002).

The spread of HIV through the sharing of needles contributes to explosive outbreaks in North America, Western Europe, North Africa, the Middle East and parts of Asia (National Research Council, Panel on Monitoring the Social Impact of AIDs Epidemic 1993). Ample empirical evidence shows that the sharing of injecting equipment among drug users is highly associated with the transmission of HIV (Jarlais, Friedman and Woods 1990; Xia et al. 1994; Stimson 1995, 1997; Wu et al. 1997; Insiardi and Harrison 1997; Rhodes et al. 1999b; Atlani et al. 2000). Furthermore, this practice has been identified not only as a direct factor for HIV transmission among IDUs, but also as a facilitator for further heterosexual transmission in the general population (Jarlais et al. 1990; Stimson 1997; Hien et al. 2000; Atlani et al. 2000).

Currently, more than 70 percent of the reported HIV infected people nationwide have been discovered among IDUs (Qu et al. 2002). HIV prevalence among IDUs has reached an alarming level in some areas of southwest China. For example, reports showed that 86 percent of HIV infections in Ruili and 66 percent in Longchuan in Yunnan province were IDUs. At least 50 percent of HIV cases at the county level in that area were associated with IDUs (Wu et al. 1997; Zhang et al. 2002). Another study documented an epidemic of HIV infection among male drug users in a village in Southwest China (Xia et al. 1994). HIV seropositivity was found to be highly correlated with injecting drug use. Of the total 183 participants, 79 (43 percent) were HIV seropositive. Among the 73 injecting drug users, eighty percent (51) were infected by HIV. The remaining 28 infected participants also acknowledged the use of drugs.

Furthermore, it was reported in this study that sharing of needles and syringes was a common behavior among IDUs.

Furthermore, it was noted that the prevalence of HIV was also disturbingly high among drug users who denied taking drugs intravenously (24%), although the rate was lower than that for injecting drug users (Xia et al. 1994). It is possible that some of the respondents may have denied occasional injecting drug use or have been infected through other means of transmission, such as unsafe sexual contact with casual sex partners and commercial sex workers (CSWs). Whether by injection or otherwise, mind altering drugs are associated with behaviors that increase the risk for HIV infection. Drug use is also found to be highly correlated with unsafe sexual behaviors (Bassel and Schilling 1991; Cottler et al. 1990). The impaired judgment associated with drugs may result in unprotected sex, and intoxication can complicate condom use or the ability to practice safe sex (Comtex 2001).

Besides the increased HIV risk among drug users themselves, unsafe drug injecting practices have also been identified as a facilitating factor for further heterosexual transmission among the general population (Jarlais et al. 1990; Xia et al. 1994; Stimson 1997; Hien et al. 2000; Atlani et al. 2000). This is because most IDUs are sexually active, and have spouses, casual sexual partners, or even relationships with CSWs. In one study conducted in Ruili of Yunnan province, it was documented that 10 percent of the wives of injecting drug users were HIV positive (Xia et al. 1994). Since a great majority of IDUs are also sexually active and promiscuous, once the virus became established among them, a primary source for further heterosexual transmission would be formed.

In China, policy on drug control mainly focuses on supply and demand reduction through strict criminal punishment (United Nations Theme Group 2002). This approach has not been very effective. Drug abuse activities are often forced underground for fear of being caught and sent to rehabilitation centers, which makes drug users a hard to reach population with little incentive to participate in HIV prevention (United Nations Theme Group 2002). Needle/syringe exchange programs are common preventive and intervention approaches in North America and Europe (Brettle 1991; Normand, Vlahov and Moses 1995; Stimson 1995; Jarlais and Friedman 1997). They are aimed at decreasing the risk of HIV infection among IDUs by encouraging them to use disposable injecting equipment. However, these harm reduction programs are not yet feasible preventive approaches in China. A great concern of the government is not only the high cost of the program, but that any program increasing access to sterile needles and syringes might be interpreted as actually promoting drug use by creating an expression of relative safety and tacit community approval of such behavior (United Nations Theme Group 2002).

Commercial sex and HIV/STDs

Prostitution was virtually eliminated in China in the early 1950s as a result of the "patriotic health campaign" program (Cohen et al. 1996). However, despite strict laws prohibiting prostitution, there has been a flourishing underground commercial sex industry since the 1980s, starting in coastal cities and large metropolitan areas and then gradually extending inland to smaller townships (China Ministry of Health 1997). Analysis of official data on arrests of prostitutes and their clients suggested that some two

million prostitution cases were processed by the Ministry of Public Security between 1982 and 1997 (Ren 1999). In 1992 alone, 240,000 prostitutes were identified in China, which was an increase of 50 percent over the previous year (Zhang et al. 1999). The actual scale of commercial sex is hard to determine since the figures refer only to detained prostitutes and their clients. One report discovered that commercial sex was booming in recent years by mapping the mushrooming entertainment establishments in the big cities (Zhong 2000).

The link between commercial sex and STDs has been extensively studied (Darrow 1984; Cohen et al. 1996; Cohen et al. 2000). In recent years, concern about this association has been further highlighted by the AIDS epidemic (Gil et al. 1996; Fleming and Wasserheit 1999; Anneke et al. 2001; Lau et al. 2002). CSWs have a significantly higher risk of acquiring STDs including AIDS because of their multiple sexual partners. At the same time, by infecting their clients, CSWs may rapidly transfer HIV/STDs to the general population. The prevalence of prostitution was found to be the main cause of the high level of HIV/STD infection in Africa, where the major route of HIV transmission is heterosexual intercourse (Philipson and Posner 1993). A similar trend has been observed in Thailand, India and Bangladesh (Ford and Koetsawang 1991; Archavantikul and Guest 1994; Lyttleton 1994; Maticka-Tyndale et al. 1997; Caldwell et al. 1999; Bandyopadhyay and Thomas 2002). Little information is known about China in this area, though commercial sex has been frequently portrayed by the media and implicated in the literature as one of the main causes for the rapid spread of HIV/STDs (Gil et al. 1996; Lau et al. 2002).

Using face-to-face interviews, Wang and his colleagues conducted a survey to

examine CSWs' awareness of HIV/STDs in entertainment establishments in Wuhan, a city in the East of China (Wang et al. 2002). The study recorded that the average age of the CSWs was 20.3 (range: 15-31). Sixty-six percent of the CSWs came from the countryside. Their educational attainment was generally low, with 67.2 percent having only 7 to 9 years of education. Among all 218 CSWs surveyed, 29 percent had at least one STD, 5.9 percent had never heard of AIDS, and 41.8 percent didn't understand the transmission of HIV/STDs. Only 18.5 percent used condoms consistently with clients and 41.8 percent had experienced condom breakage during sexual services.

Another study conducted in Southwest China discovered that CSWs might also be heavy users of illicit drugs (Qu et al. 2002). Of the 482 sex workers surveyed, eight percent (36) had lifetime history of drug use and seven percent reported injecting drugs. Among IDUs, eighty five percent shared syringes and needles, and ninety percent had at least once exchanged sex for drugs in the past years. Only a small portion of respondents always used condoms with their customers (24 percent), spouse (12 percent) and boyfriends (17 percent) in the past year. The interactions between illicit drug use and commercial sex facilitate the diffusion of HIV/STD infection to the general population.

The role that commercial sex plays in the spread of sexual transmitted diseases including AIDS in a community has been demonstrated by the evolution and diversification of commercial sex and the changing patterns of HIV infection (Hsieh 2002). The prevalence of commercial sex in Thai society during the early to mid-1990s was identified as a major source of the rapid spread of HIV/STDs. The high level of interregional mobility during that period ensured that HIV was transmitted by both CSWs and their clients to all regions of the country. The national public campaign against

AIDS and the "100% Condom Program" in commercial sex setting in late 1990s were hailed as important factors of the current decrease of HIV infection in Thailand (Hsieh 2002)

Faced with a flourishing commercial sex industry, effective intervention approaches should be strongly advocated. Lessons can be learned from the situation in Thailand. In Chinese culture, however, there is a general reluctance to talk about issues related to sex, such as condoms use (Wu et al. 1997). Before 1994, condoms were not promoted for the prevention of STDs, but only for unwanted pregnancy, although using condoms is the best measure to prevent HIV/STDs (United Nations Theme Group 2002). The Chinese government once refused to endorse condom use as the most effective defense against HIV/AIDS, perceiving it as encouraging sexual promiscuity (Pan 1995). Prostitutes are afraid of carrying condoms with them as it could be used against them as proof of prostitution (Lau et al. 2002). The over-all level of condom use is generally very low in contemporary China (Joint United Nations Programme on HIV/AIDS 2002). Presently, condom use programs are promoted, but only in a few big cities (Wang et al. 2002).

RESEARCH ON POPULATION MOBILITY AND HIV/STDs

Globally, the link between population mobility and HIV/STDs has been well documented. From the beginning of the epidemic, one of the major concerns of the government has been that the people who move between countries might be spreading HIV/STDs. To enhance surveillance, new laws have been passed in some countries to restrict HIV-positive persons to enter or leave a country freely (Gellert 1993; Evans 1996;

Joint United Nations Programme on HIV/STDs 2001). Studies on certain highly mobile groups, such as truck drivers, itinerant traders and seafarers, have identified travel or migration as a factor related to infection (Sircar and Tewari 1996; Stimson 1997; Brockerhoff and Biddlecom 1999; Bryan, Fisher and Benziger 2001). In South Africa, the spread of HIV/STDs followed the main traffic route of truck drivers and fishermen (Obbo 1993; Brockerhoff and Biddlecom 1999). Migrants and seasonal workers have been identified as high-risk groups for HIV/STD infection in the United States (Organista and Organista 1997). A similar trend was found in South Asia (Skeldon 2000). In China, a large number of illicit drug users and the associated HIV/AIDS cases were found among the temporary rural-urban migrant population (Yu et al. 1996; Yang 1999).

In the early years of the AIDS epidemic, biomedical research tended to view HIV as a common communicable virus. Population migration was therefore treated as a "HIV transporter" because it created a ready environment for infectious agents to be transmitted. This conventional epidemiological interpretation is basic for the understanding of the spread of any infectious disease, but it fails to recognize the social and behavioral aspects of HIV infection (Caldwell et al. 1997).

Later, psychological and behavioral research called for attention to individuals at risk with the consideration of related social and environmental variables. Though migrants seem at higher risk for poor health than the general population (Brindis et al. 1995), they are particularly vulnerable to HIV infection because they are more likely to practice HIV risk behaviors (Hunt 1989; Parker 1997; Brockerhoff and Biddlecom 1999; Yang 2002a). With the changing face of the HIV epidemic, this approach has recently been broadened to focus not only on the individual risk-taking behavior, but also on the

immediate environmental and social factors that influence such behavior. The concept of high-risk situations or high-risk environments is developed to address the societal factors behind the epidemic spread of HIV (Zwi and Cabral 1991). It may be particularly important in understanding the relationship between population migration and the changing HIV transmission dynamics in the contemporary world. In particular, being a migrant itself cannot lead to HIV infection. Rather it is the new environment that migrants encounter during and after migration that puts them at a higher risk for HIV infection (Joint United Nations Programme on HIV/AIDS 2001)

Hunt (1989) stated that the migratory system in the eastern, central, and southern Africa caused the long absence of family members, increased family breakdown, and increased numbers of sexual partners. As a result, it created a population, which suffered from epidemics of sexually transmitted diseases, including HIV/AIDS. Based on the examination of the AIDs and HIV seropositivity prevalence data, the study supported the role of migrant laborers in the transmission of HIV/STD with a concentration on migrant's vulnerability.

Another study presented the social and behavioral mechanisms that resulted in migrants' higher vulnerability to HIV than non-migrants in Africa (Brockerhoff and Biddlecom 1999). It was shown that migration was a critical factor in high-risk sexual behavior, such as multiple sexual partners and unprotected sex. First, migrants are predisposed towards riskier sexual behavior than others owing to their personal characteristics established before migration, such as venturousness. Second, being away from regular sexual partners or spouses, migrants may experience changes in sexual practices that are conducive to HIV infection. Finally, the social milieu in which

migrants live may place them in an environment, which is conducive to high-risk behaviors.

The social and behavioral mechanisms of HIV infection in China have also been discussed from a broader social and contextual perspective (Yang 2002a). Migrants' vulnerability to HIV/AIDS has been conceptualized as resulting from: (1) individual characteristics due to pre-migration selectivity, (2) separation from spouse or regular sexual partner during the migration process, and (3) post-migration exposure to new social and economic environments in the place of destination.

> Pre-migration selectivity implicates that migrants are more likely to be risk takers with respect to sex and drugs than comparable non-migrants due to their inborn risk taking traits or tendency. .....The post migration social isolation, residential segregation and economic marginalization have greatly limited migrants' opportunities for stable employment and upward social mobility. .....Faced with uncertainties in the job market, alienation due to social and residential isolation, and economic hardship, many migrants may turn to illicit drug use and prostitutions as a way to escape the post-migration loneliness, frustration, and anxieties. .....Migrants' separation from their homes does not only disrupt their family and regular sexual relationship, ...but also leads to a breakaway from the tradition family supervision. .....A detachment from the usual social and normative controls may furthermore lead to their venture on commercial sex and other socially deviant behaviors. .....It is the confluence of post-migration social isolation, economic marginalization, residential segregation, and lax of social control that contributes to migrants' higher frequency of HIV risk-taking behaviors, ...which in turn makes them more susceptible to HIV infection. (Yang 2002a. P8-15).

It was emphasized that the study of HIV/AIDS was as much a social as a medical problem. All kinds of social, cultural, and contextual factors contributed to the rapid spread of HIV in China. Such a conceptualization of HIV transmission does not only provide us a better understanding of the relationship between migration and migrants' risk for HIV, but also helps understand how an individual's behaviors are shaped by the social and economic environments.

While individual level analyses on migrant's vulnerability are necessary to understand how individuals may be infected, they may capture only part of the mobility-HIV/STDs dynamics by missing the impact of population mobility on the overall social setting (Parker 1996; Campbell and Brian 1999). There was recognition that mobility and HIV/STD vulnerability is not simply an issue of migration, but rather the social and geographic linkages operating within a particular social structure. The extent of vulnerability is faced by all the persons in the social settings (Hsu 2001). In the earlier stage of the HIV epidemic, the contextual factors that the migrants encountered during migration process contributed to their increased risk for HIV infection. Presently, HIV infection has been bridged to the general population in which population migration plays an important role (Chantavanish 2000). Therefore, the issue of population mobility and migrants' HIV/STD vulnerability is not just the concern for migrants, but more broadly for all people in the social setting.

Overtime, therefore, there is a shift of focus from high-risk groups and individual HIV/STD risk behaviors to high-risk situations (Zwi and Cabral 1991; Ford and Koetsawang 1991; Tawil, Verster and O'Reilly 1995; Sweat and Denison 1995; Parker 1996; Rhodes et al. 1999a; Rhodes et al. 1999b; Campbell and Williams 1999; Delor and Hubert 2000; Parker, Easton and Klein 2000; Atlani et al. 2000; Sumartijo 2000; Wang and Gao 2000). With respect to mobility-HIV/STD dynamics, population migration creates vulnerable environments, which may contribute to the spread of HIV/STDs not only among migrants but also to the general population through the following mechanism:

First, migrants may affect the prevalence of certain socially deviant and epidemiologically risky behaviors in a social setting, which may directly or indirectly

affect all people living in it (Rhodes et al. 1999b; Yang 2002c). On the one hand, the prevalence of certain behaviors such as drug use and commercial sex in a community would greatly decrease the cost and increase the availability of, and access to, drugs and commercial sex (Baseman, Ross and Williams 1999). On the other hand, the prevalence of certain risk behaviors may also contribute to a more tolerant normative environment for engaging in the behaviors in a certain social setting (Brewster et al. 1993; Yang 2002c). The existence or prevalence of risky behaviors can set real life examples for others in the community to follow (Yang 2002c). Human beings are social animals, whose behaviors will affect and be affected by the society in which they live. Therefore, the prevalence of HIV/STD risk behavior creates a risk environment, which renders all individuals in it to a greater likelihood of practicing similar risky behaviors.

Second, the level and pace of HIV/STD transmission are determined by the potential exposure of individuals to the infected agents and the frequency of the unsafe contact (Ford and Koetsawang 1991). Population mobility results in a large number of infected migrants and then may create a pool of infected agents in the places of destination. People who directly or indirectly come into contact with infected migrants would be at a higher risk. One could be infected without even practicing risk behaviors through heterosexual transmission with infected regular sexual partners, or by the transfusion of contaminated blood. Furthermore, going back to the conventional epidemiological point of view, population mobility brings more people into more frequent and closer contact and creates a greater mixing in the places of destination, which increases the possibility of unsafe contact with individuals who have been infected (Obbo 1993). Migrants may infect or be infected by their regular or casual sexual

partners, and then spread the virus to the others in the places of destinations or the places of origins when they return home. Through the movement of infected people and their contacts with others during the migration process, the virus can be transported to places where HIV/STDs was previously unknown. The presence of migrants and their personal or social networks can further define and shape the pattern of HIV/STD transmission. Therefore it is generally acknowledged that HIV/STDs, like other infections, follows the geographic and social networks of migration (Wallace 1991; Obbo 1993).

Third, population mobility may create a "bridging population", consisting of those who have sex with both high-risk and low-risk partners. Transmission across different risk behaviors and across different subpopulations could further accelerate the spread of HIV/STDs (Morris et al. 1996; Atlani et al. 2000; Gorbach et al. 2000). It has been suggested that men who have unprotected sex with both commercial sex workers and regular sex partners played an important role for the spread of HIV/STDs in Thailand (Havanon, Bennett and Knodel 1993; Morris et al. 1996). It is also frequently observed IDUs may also engage in sex with multiple sexual partners or even CSWs (Cottler et al. 1990). Meanwhile CSWs may also be heavy users of illicit drugs (Qu et al. 2002); therefore, blood transmission and heterosexual transmission are bridged. Moreover, the high mobility of both CSWs and IDUs may rapidly bring HIV to a subpopulation or a new location. IDUs, CSWs and temporary migrants are all high-risk groups for HIV/STD infection. The interrelation between these groups may greatly accelerate the spread of HIV/STD infection across risk groups to the general population.

In summary, the health of an individual can be best ensured by maintaining or improving the health of the entire community (Satchel 1995). In other words, health is

far more readily determined by social conditions than by individual behaviors (Duncan, Kelvyn and Graham 1993). Population mobility at the macro level may create high-risk situations or high-risk environments that affect one's ability to exert control over one's health (Atlani et al. 2000). People in high-risk settings are less likely to be receptive to educational efforts urging changes in individual behavior. The focus on social vulnerability is crucial not only to our understanding of the dynamics of the HIV/STDs epidemic, but also to any strategies designed to diminish its advance (Parker 1996).

It has been documented that the high prevalence of drug use, especially injecting drug use, and commercial sex are both high-risk environments for the spread of HIV/STDs in Thailand, South Africa and the former Soviet Union (Ford and Koetswang 1991; Rhodes et al. 1999a; Rhodes et al. 1999b). Population migration has also been suggested in previous studies as a contributing factor in the creation of HIV risk situations (Zwi and Cabral 1991; Rhodes et al. 1999a; Atlani et al. 2000). These macro-level risk environments, which are still under-researched, are perhaps shaping the present trend of the global HIV/STD epidemic as well as that in China. Unfortunately, HIV/STDs research in China has so far paid little attention to the contextual factors. A better understanding of macro-level high-risk environments based on empirical studies like the one proposed may provide unique opportunities for predicting, and thus preventing the further spread of HIV/STDs in China.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Based on the above discussions, this study is designed to test a community-based model of temporary migration and HIV/STD diffusion among the general population (see

Figure 1). It is hypothesized that communities with high levels of temporary migration are more likely to have higher prevalence of drug abuse and commercial sex, which, therefore, have high rates of HIV/STDs among the residents. It is further hypothesized that at the macro level, temporary migration itself is also directly associated with the spread of HIV/STDs among the general population in China.

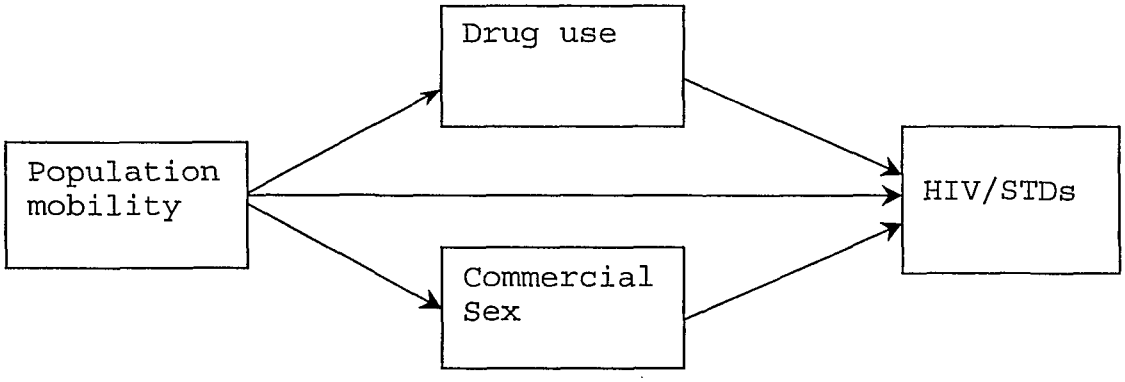
The upsurge of temporary migration, which is resulted directly from social and economic change, has greatly contributed to the spread of illicit drug use and commercial sex in contemporary China (Situ and Liu 1996). The prevalence of drug use and commercial sex may provide more opportunities for individuals to practice these risk behaviors by increasing the access to illicit drugs and commercial sex. It also contributes to changes in social norms regarding these behaviors (Brewster et al. 1993; Yang 2002c). Therefore, the prevalence of these socially deviant behaviors in a community greatly weakens residents' ability to control their health related behaviors. All people in the environment are more or less exposed to potential risk of HIV/STD infection.

Due to their unique contexts during and after migration, temporary migrants are prone to HIV/STD risky behaviors and consequently vulnerable to HIV/STD infection. Not surprisingly, it has been found that a vast majority of the earlier known HIV/STD cases, drug abusers, and commercial sex workers are migrants from the rural areas (Zhang and Ma 2002). When a large pool of infected agents is created in the places of destination, it also increases local non-migrant residents' likelihood of being infected by HIV/STD due to the increased exposure to the virus. Migration of infected persons may further spread the virus to previously untouched areas through migration networks. Therefore, a combination of high level of temporary migration, migration-induced high

prevalence of drug use and commercial sex greatly facilitates the spread of HIV/STDs in contemporary China.

In summary, temporary migration in China is associated with high-risk environments, the prevalence of drug abuse and commercial sex, which are the preconditions for the rapid spread of HIV/STDs among the general population. At the macro level, temporary migration itself is an independent high-risk precursor for the transmission of HIV/STDs in China.

Figure 1: Theoretical Framework for Population Mobility, High-Risk Environments and the Diffusion of HIV/STDs in China.



Specifically, this study attempts to test the following six hypotheses regarding the relationship between temporary migration and the spread of HIV/STDs in China:

H_1: Communities with higher levels of temporary migration tend to have higher levels of drug use.

H_2: Communities with higher levels of temporary migration tend to have higher levels of commercial sex.

H_3: Higher levels of drug are associated with higher prevalence of HIV/STDs in a community.

H_4: Higher levels of commercial sex are associated with higher prevalence of HIV/STDs in a community.

H_5: Higher levels of temporary migration are associated with higher prevalence of HIV/STDs in a community.

H_6: Higher levels of temporary migration in a community are associated with higher prevalence of HIV infection among non-migrant residents in a community.

CHAPTER III

METHODOLOGY

This chapter is divided into six sections, including data sources, sample, variables and measurements, data manipulation, techniques of analysis, and limitations of the study.

DATA SOURCE

The data used in this study come from a specially designed community-level survey in a province in Southwest China. The survey is a part of a larger on-going project funded by the National Institute on Drug Abuse. The project focuses on the link between spatial mobility, HIV/STD risk-taking behaviors, and HIV/STD infection.

By using a specially designed questionnaire, the survey covered an entire province with a total population of over 42 million. The actual data collection was conducted by the Provincial Statistical Bureau. The agency sent out the questionnaires between the end of 2000 and the beginning of 2001 to the local offices throughout the province and required them to complete the questionnaire with annual information between 1996 and 2000 from the existing statistics yearbook and other official reports from local governments and related agencies. The survey contained aggregate level of information on a wide range of social and economic indicators, as well as on HIV/STD incidences, detained drug addicts and detained sex workers. For annual incidences of HIV/STDs, data were collected at the county/city level, based on sentinel surveillance data on HIV from the provincial department of health. All other data were recorded at the township level in rural areas and town/district level in urban settings.

SAMPLE AND UNIT OF ANALYSIS

The focus of this study is to examine the connection between population mobility and HIV/STD infection at the aggregate level. The unit of analysis in this study is not individual migrants or risk behavior, but the residential community.

In every province in China, there are three levels of administrative entities: town or township, city, and county. A city is the highest urban designation. Town or township is the subdivision under a city or a county. Because the most important variables in the research - HIV and STD related information - were collected at the county/city level, all other data, which were collected at the township and town level, are aggregated to county level for analyses. There are a total of 128 cities and counties in the province. The community in this study is defined as a city in the urban area or a county in the rural area, which constitutes the unit of analysis in this study.

VARIABLES AND MEASUREMENT

Independent variable

Population mobility is the main independent variable. It is measured by the proportion of annual in-and-out temporary migrants in a city/county. The exact numbers of migrants and the total permanent population in each county/city are official data collected by the survey. The proportion of temporary migrants is calculated by dividing the total temporary migrants in a community by the total permanent residents and then multiplied by one thousand. Thus the measure indicates the number of migrants per 1,000 permanent residents.

Intervening variables

There are four intervening variables in this study: drug addicts, injecting drug users, commercial sex workers, and entertainment establishments. The first two reflect the prevalence of drug use, while the last two indicate the prevalence of commercial sex activities. The separation of injecting drug users from the total drug addicts is to further highlight the particularly elevated HIV risk associated with injecting drug use. The number of detained CSWs may fail to capture the real situation of commercial sex activities, so another variable - the number of entertainment establishments, (namely, dancing halls, karaoke bars, sauna baths and beauty salons, which are generally perceived to be the places for the underground commercial sex activities in China) - is used as a measure of the prevalence of commercial sex in a city or county. The number ranges from 0 to 1,394.

Due to the sensitivity of the information on drug use, commercial sex and HIV prevalence, the original data, which recorded the exact numbers of cases, were converted into indices before they were entered into computer data files. The main reason for the conversion was to prevent the possible negative publicity about the city or county.

The conversion of the original data, which was performed by the investigators in China, involved two steps. First, the number of known drug addicts, IDUs, detained CSWs, and reported HIV infections were all regrouped into respective interval distributions. The number of intervals used to regroup the five indicators varied depending on the range of dispersion of each indicator. The wider the range of dispersion of an indicator, the more intervals were used to regroup the raw data in order to minimize the loss of variation across counties/cities due to regrouping. For each of the five interval

distributions, a numerical index was then created by assigning in ascending order starting with 0 an integer code to represent each interval in the distribution (Yang 2002c).

As stated above, the original data were collected at the township level in rural areas and town/district level in urban setting. They are aggregated to city/county level for analysis by adding the index value for each town, township and district in a city/county together. Then a new index is created to measure the probable prevalence of those activities at a city/county level. The resulting city/county level index for total drug addicts, injecting drug users, and commercial sex workers ranges from 0 to 360, 0 to 199, and 0 to 82, respectively. For all three indices, the higher the index value, the higher the prevalence of the activity.

Dependent variables

The dependent variables are the prevalence of HIV, the prevalence of STDs in a community, and the prevalence of HIV among the non-migrant residents in a community. As mentioned above, the measure of the prevalence of HIV is an index instead of actual numbers of cases. The index for the prevalence of HIV in a community ranges from zero to nine[2], with the higher value symbolizing the higher prevalence of HIV.

The prevalence of HIV among non-migrant residents is not directly available in the data set. Based on the index for HIV in a community, the average number for each index value is used to represent the actual number of cases in the community. The

[2] The original HIV index recorded in the data contains two rankings. The integer portion represents a prefecture ranking in the provinces, based on the combination of the levels of HIV prevalence among the general population, IDUs and CSWs. The decimal portion of the index stands for a county's ranking within the prefecture according to the actual known HIV cases in the county (Yang, 2002c). Based on the aim of this study, only the second level, the decimal proportion is considered in this study, The original ranking of 0.0-0.9 is recoded as 0-9.

approximate number of HIV cases among non-migrant residents in a community is calculated by multiplying the average number of HIV cases for the index value for a community by the percentage of HIV cases among the non-migrants. It is then converted into an index in the same way as stated above. The resulting index also ranges from zero to nine. The prevalence of STDs is measured by the actual number of reported STD incidences, which was recorded in the dataset. The number at a city/county level ranges from 0 to 2,570.

DATA MANIPULATION[3]

The variables used in this study were recorded separately in five subsets either at the city/county level or at the town/township level. The data that were recorded at the town/township in the original data are aggregated to the city/county level and then merged into one data set for analysis in this study.

The five data sets are not from the same origin, as different government agencies are responsible for keeping records of different information. When merging the data, it is found that among the 128 cities/counties, there are two places that don't have the basic information on population, drug use and commercial sex, though data on HIV/STD for those two places are recorded. Therefore, the two places are excluded from the analysis. The final sample in this study includes 126 counties/cities in that province.

Information on HIV and STD incidences were recorded by a different agency before 2001 in China. STD incidences, were collected by the provincial STD and

[3] The imputation of missing values follows the approach set for quantitative social research written by S. Obeng-Manu Gyimah in *Missing Data in Quantitative Social Research*, Population Studies Center, University of Western Ontario, London, Canada N6A 5C2. ISSN 1183-7284 [Online]. Available: http://www.ssc.uwo.ca/sociology/popstudies/dp/dp01-14.pdf.

Leprosy Control Center with 128 cities/counties included. HIV cases came from HIV sentinel surveillance station, with 112 cities/counties included, because there were no sentinel surveillance stations in some cities or counties. Furthermore, HIV information on certain city/counties in certain years was not available because sentinel surveillance was not carried out in that year or for some other reasons. Therefore, there were up to 23 percent missing values in HIV dataset. Based on the recorded number of STD incidences in that city/county, the mean numbers of STDs by year, and the information from the government report, the missing HIV data are replaced by year with an approximate index value (high: 9, medium high: 6, medium: 3, Low: 0) to estimate the prevalence of HIV in that county/city. For example, it is found that HIV data for a city, where a high prevalence of HIV have been discovered according to the government report, is missing. When checking the STD data, the reported number of STD cases in this city is also among the highest numbers recorded. So the missing value on HIV for this city is replaced by the highest index value 9. Similarly, for their missing HIV value in the cities/counties where the number of recorded STD cases was higher than the mean number but lower than the maximum number in that year, the index value for that year is replaced by 6. If the recorded number of STDs was closed to the mean number, it is replaces by 3. For the rest of places, where HIV cases were seldom reported and the recorded number of STD cases was rather small, the missing HIV data is replaced with an index value of 0.

For all the other missing values on STDs, total drugs addicts, injecting drug users, commercial sex workers and entertainment establishment in the other sub-data sets; the missing values are replaced by the mean value by year for each variable.

ANALYSIS PLAN

At the univariate level, the demographic characteristics of the community will be presented to describe the distribution of temporary migrants, the prevalence of drug use, the prevalence of commercial sex, the prevalence of HIV/STDs in a community and the prevalence of HIV among non-migrant residents in the community.

At the bivariate level, correlation analysis will be performed to examine the association between the proportion of temporary migrants and the prevalence of HIV/STDs in a community and the prevalence of HIV among non-migrant residents, the association between the number of temporary migrants and the prevalence of drug use and the prevalence of commercial sex. The association between the prevalence of drug abuse and the prevalence of commercial sex, and the prevalence of HIV and STDs in a community and the prevalence of HIV among non-migrant resident residents will also be examined by correlation analysis.

LIMITATIONS OF THE STUDY

There are primarily four limitations in this study. First, the most important information in this study is all very sensitive issues, especially in China. Most local governments tend to hide or underreport the seriousness of the problems for fear that an open assessment of their locality might lead them being accused of ineffectiveness in controlling those social vices (United Nations Theme Group 2002). Therefore, it is possible that the data fail to capture the actual situation or the extent of various problems. Furthermore, information on HIV is collected twice a year through the provincial surveillance systems which remains paramount to monitor infection trends among

subgroups of the most vulnerable population including STD patients, drug users, truck drivers and pregnant women. Data collected may be less likely to represent the situation among the general population.

Second, sentinel surveillance is not carried out every year in China. Data on HIV in certain years in certain counties and cities are thus not available. Though the missing value has been replaced based on the information from the government report and the recorded STD incidences, the replacement itself could have an adverse influence on statistical analysis. Furthermore, the aggregation of the three variables (total drug addicts, IDUs and CSWs) from the town/township to the city/county level is performed by summing up the index values instead of the real number of cases. Therefore, the resulting index value may provide a measure to examine the variance between the communities, but fails to show the exact extent of the prevalence of those activities in a community. Moreover, the aggregation of the data from town/township to the city/county itself may not be salient to measure the impact of risk environments on individual's behaviors in this study. It was suggested in a previous study that neighborhood is probably the most relevant aggregate level for the study related to behaviors, as norms are likely to be more effective to constrain individual's behaviors when the sanction accompany them are leveled by persons within an individual's daily life (Brewster et al. 1993). Therefore, the level of aggregation from town/township to city/county level may be another methodological limitation in this study.

Third, only bivarriate correlation analysis is performed in this study, which cannot show if there is indeed a causal relationship between population mobility and the prevalence of HIV/STDs. Furthermore, although temporary migration is considered to be

a key factor for the spread of drug use and commercial sex in China, other social and economic determinants, which may be associated with both temporary migration and the prevalence of HIV/STDs, are not controlled in this study.

Fourth, data used in this study were collected from a single province in southwest China, which has long been the epicenter of HIV/AIDs in China. It is possible that findings of this study may not be generalized to other provinces in China or other countries in the world.

Those four limitations above might affect both the internal and external validity of this study. However, this is the best information that could possibly be obtained for this study in the present situation in China. Further research should be continued to examine the macro-level contextual factors that may contribute to the rapid diffusion of HIV/STDs in the society.

CHAPTER IV

RESULTS

Using data collected in a community-level survey conducted in the Southwest of China, this study examines the relationship between population mobility and the prevalence of HIV/STDs. This chapter presents the findings of the study and is broken down into two sections. Descriptive statistics are discussed first, followed by the results of correlation analysis.

DESCRIPITIVE STATISTICS

Information in Table 1 summarizes the characteristics of the sample. The proportion of temporary migrants in a city/county ranged from 5 per thousand to 533 per thousand from 1996 to 2000. The mean numbers of migrants per thousand populations by year ranged from 50 to 63 from 1996 to 2000, showing a clear increasing trend.

The index measuring the prevalence of HIV in a city/county ranged from 0 to 9. The mean incidences by year ranged from 2.31 to 2.90. The index measuring the prevalence of HIV among non-migrant residents also ranged from 0 to 9 and the mean incidences by year ranged from 2.20 to 2.84. In contrast to what was expected, there was no a clear pattern increasing over time. Both the mean indices measuring the prevalence of HIV in a whole community and among non-migrant residents showed the highest in 1997 and the lowest in 1998. The reason for the variation is maybe that the prevalence of HIV was measured by the reported HIV incidences, and underreporting might have a great impact on the validity of the data.

The prevalence of STDs in a community is measured by the number of reported STD cases. The number over the five years ranged from 0 to 2,570 and the mean incidences by year ranged from 61 to 141. A trend of increase of STD incidences over time was found except for a small drop in 1997 and 1998. However, these reports could be underreported, as they were collected only through the record of the provincial STD and Leprosy Control Center. It is acknowledged that a lot of STD incidences in China are still left unattended or untreated (United Nations Theme Group 2002).

The index measuring the prevalence of total drug addicts in a county/city ranged from 0 to 360. The mean incidences by year ranged from 29.90 to 51.71, showing a general pattern increasing over time, except for a small drop in 1999. The index for injecting drug users ranged from 0 to 199. The mean incidences by year ranged from 16.86 to 24.71, showing a patter of increase over time. The index measuring the prevalence of commercial sex workers ranged from 0 to 82 and the mean incidences by year ranged from 8.48 to10.25. The number of entertainment establishments in a city/county ranged from 0 to 1,394 and the mean numbers by year ranged from 77 to 116. Generally these two high-risk environments - the prevalence of drug use and commercial sex - showed a pattern increasing over time, though there was some variation in certain years. For example, the mean index measuring total drug addicts in 1998 was higher than in 1999. The mean index measuring commercial sex workers in 1996 was higher than in 1997. The reason might be that the data were collected based on the detained cases, which greatly depended on the effort of the local police in tracking down the cases. The more efforts made in a certain year; the larger number of cases would be discovered. Generally, the reported numbers of drug abuse and commercial sex cases were believed

to be underreported (United Nations Theme Group 2002). Furthermore, the aggregation of the indices from the town/township level to city/county might exert an adverse effect on the accuracy of the data, as it was performed by adding the index value together rather than being converted from the summing up of real numbers of recorded cases at the town/township level.

Table 1. Sample Characteristics

Variable:	N	Mean	S. D.	Min.	Max.
1) Number of Temporary Migrants per 1,000 Permanent Residents					
1996	126	49.59	41.53	7.56	292.29
1997	126	52.01	44.65	5.93	323.11
1998	126	56.08	52.03	5.33	407.66
1999	126	61.23	62.25	6.64	510.28
2000	126	63.18	68.09	8.15	533.16
2) Index for Prevalence of HIV in a Community					
1996	126	2.57	3.24	0.00	9.00
1997	126	2.90	3.31	0.00	9.00
1998	126	2.36	3.07	0.00	9.00
1999	126	2.32	3.09	0.00	9.00
2000	126	2.46	3.08	0.00	9.00
3) Prevalence of HIV among Non-migrant Residents in a Community					
1996	126	2.42	3.06	0.00	9.00
1997	126	2.84	3.29	0.00	9.00
1998	126	2.69	3.02	0.00	9.00
1999	126	2.20	3.02	0.00	9.00
2000	126	2.43	3.05	0.00	9.00

Table 1. Continued

Variable:	N	Mean	S. D.	Min.	Max.
4) Prevalence of STDs in a community					
1996	126	68.10	144.71	0.00	1037
1997	126	60.79	108.12	0.00	754
1998	126	65.97	104.91	1.00	650
1999	126	103.17	180.65	0.00	1312
2000	126	141.52	306.42	0.00	2570
6) Index for IDUs					
1996	126	16.86	29.60	0.00	157
1997	126	19.56	31.56	0.00	168
1998	126	22.67	34.55	0.00	168
1999	126	23.40	38.04	0.00	190
2000	126	24.71	38.14	0.00	199
7) Index for CSWs					
1996	126	8.49	11.74	0.00	76
1997	126	8.48	11.73	0.00	71
1998	126	9.15	12.43	0.00	77
1999	126	10.11	13.05	0.00	82
2000	126	10.25	12.75	0.00	78

Table 1. Continued

Variable:	N	Mean	S. D.	Min.	Max.
8) Number of Entertainment Establishments					
1996	126	77.16	120.86	0.00	901
1997	126	88.54	132.82	0.00	1040
1998	126	109.11	171.94	0.00	1284
1999	126	108.39	152.59	0.00	1324
2000	126	116.23	158.71	0.00	1394

CORRELATION ANALYSIS

Table 2 presents the correlation coefficients between the number of temporary migrants per 1000 permanent residents and the high-risk environments by year from 1996 to 2000. The results show that all the four risk-environments measurements - total drug addicts, IDUs, CSWs and entertainment establishments - were positively associated with the number of temporary migrants per thousand populations. Among them, the number of entertainment establishments had the strongest association. The correlation coefficients ranged from 0.5531 to 0.7698 and basically increased each year from 1996 to 2000 ($p < .01$). All of the other associations were also statistically significant ($p < .01$). However, inconsistent with what has been observed from the descriptive statistics, there was no clear pattern increasing over time.

As expected, the findings in Table 2 support the first two hypotheses: Communities with higher levels of temporary migration tend to have higher levels of drug use. Communities with higher levels of temporary migration tend to have higher levels of commercial sex.

Table 3 reflects the findings about the relationship between the high-risk environments and the prevalence of HIV in a community. The index measuring total drug addicts was positively associated with the prevalence of HIV. The correlation coefficients by year ranged from 0.5226 to 0.6314 ($p < .01$). A positive correlation between the index measuring the prevalence of IDUs and the prevalence of HIV in a community was also revealed. The correlation coefficients ranged from 0.4912 to 0.5521 ($p < .01$). The index for commercial sex workers was positively associated with the prevalence of HIV. The correlation coefficients ranged from 0.2276 to 0.3123 ($p < .01$).

Table 2. County/City Level Correlation Coefficients between the Number of Temporary Migrants per 1,000 Permanent Residents and HIV/STD High-Risk Environment Indices, 1996-2000

High-Risk Environments	Number of Temporary Migrants per 1,000 Permanent Residents				
	1996	1997	1998	1999	2000
Total Drug	0.2802**	0.2867**	0.3031**	0.3001**	0.2860**
Addicts	(126)	(126)	(126)	(126)	(126)
IDUs	0.3662**	0.3571**	0.3882**	0.4101**	0.3538**
	(126)	(126)	(126)	(126)	(126)
CSWs	0.3066**	0.3128**	0.3849**	0.4125**	0.3463**
	(126)	(126)	(126)	(126)	(126)
Entertainment	0.5531**	0.5963**	0.6847**	0.7437**	0.7698**
Establishments	(126)	(126)	(126)	(126)	(126)

Notes: Number in parentheses is numbers of valid observations.
*p < .05. **p < .01

Table 3. County/City Level Correlation Coefficients between the High-Risk Environment Indices and the Prevalence of HIV in a Community, 1996-2000

High-Risk Environments	Prevalence of HIV in a Community				
	1996	1997	1998	1999	2000
Total Drug	0.5446**	0.5226**	0.5441**	0.5420**	0.6314**
Addicts	(126)	(126)	(126)	(126)	(126)
IDUs	0.5000**	0.4912**	0.5196**	0.4904**	0.5521**
	(126)	(126)	(126)	(126)	(126)
CSWs	0.2524**	0.2725**	0.2736**	0.2276*	0.3123**
	(126)	(126)	(126)	(126)	(126)
Entertainment	0.2559**	0.2646**	0.3260**	0.2856**	0.3500**
Establishments	(126)	(126)	(126)	(126)	(126)

Notes: Number in parentheses is numbers of valid observations.
*p < .05. **p < .01

But in contrast to what was expected, the above associations didn't show a pattern of increase over time. The number of entertainment establishments was also positively associated with the prevalence of HIV in a community. Except for a small drop in 1999, the correlation coefficients by year ranged from 0.2559 to 0.3500 and basically increased each year from 1996 to 2000 ($p < .01$).

Contained in Table 4 are the findings about the relationship between the high-risk environments and the prevalence of HIV among non-migrant residents in a community. Consistent with the results in table 3, the index measuring total drug addicts was positively associated with the index measuring the prevalence of HIV among non-migrant residents. The correlation coefficients by year ranged from 0.3983 to 0.6375, showing a clear pattern increasing over time from 1996 to 2000 ($p < .01$). The index measuring IDUs was positively associated with the prevalence of HIV among non-migrant residents. The correlation coefficients by year ranged from 0.4486 to 0.6375, and basically increased each year from 1996 to 2000, except for a small drop in 1999, ($p < .01$). The index measuring CSWs was positively associated with the prevalence of HIV in a community. The correlation coefficients by year ranged from 0.2430 to 0.3181 ($p < .01$). The number of entertainment establishments was also positively associated with the prevalence of HIV in a community. The correlation coefficients ranged from 0.2615 to 0.3548 ($p < .01$).

Table 5 presents the correlation coefficients between the high-risk environments and the prevalence of STDs in a community. The index measuring total drug addicts was positively associated with the prevalence of STDs. The correlation coefficients ranged from 0.2252 to 0.4459 ($p < .01$). The index measuring IDUs was also positively

Table 4. County/City Level Correlation Coefficients between the High-Risk Environment Indices and the Prevalence of HIV among Non-migrant Residents, 1996-2000

High-Risk Environments	Prevalence of HIV Among Non-migrant Residents				
	1996	1997	1998	1999	2000
Total Drug	0.3983**	0.5032**	0.5562**	0.5588**	0.6375**
Addicts	(126)	(126)	(126)	(126)	(126)
IDUs	0.4486**	0.4763**	0.5309**	0.5057**	0.5624**
	(126)	(126)	(126)	(126)	(126)
CSWs	0.2487**	0.2476**	0.2826**	0.2430**	0.3181**
	(126)	(126)	(126)	(126)	(126)
Entertainment Establishments	0.2979**	0.2615**	0.3419**	0.2943**	0.3548**
	(126)	(126)	(126)	(126)	(126)

Notes: Number in parentheses is numbers of valid observations.
*p < .05. **p < .01

Table 5. County/City Level Correlation Coefficients between the High-Risk Environment Indices and the Prevalence of STDs in a Community, 1996-2000

High-Risk Environments	Prevalence of STDs in a Community				
	1996	1997	1998	1999	2000
Total Drug	0.2252**	0.3923**	0.4459**	0.4142**	0.4279**
Addicts	(126)	(126)	(126)	(126)	(126)
IDUs	0.2994**	0.4999**	0.5263**	0.5107**	0.5094**
	(126)	(126)	(126)	(126)	(126)
CSWs	0.2892**	0.4184**	0.5700**	0.5634**	0.4817**
	(126)	(126)	(126)	(126)	(126)
Entertainment	0.0967	0.1870*	0.4371**	0.5215**	0.4388**
Establishments	(126)	(126)	(126)	(126)	(126)

Notes: Number in parentheses is numbers of valid observations.
*$p < .05$. **$p < .01$

associated with the prevalence of STDs. The correlation coefficients ranged from 0.2994, 0.5263 ($p < .01$). There was a positive association between CSWs and the prevalence of STDs. The correlation coefficients ranged from 0.2892 to 0.5634 ($p < .01$). However, the association between the index of entertainment establishments and the prevalence of STDs was not significant in 1996. The reason entertainment establishments were not significant in the first year of the study was that they were just emerging and becoming popular. It is noticed that over time the correlations increase and become steadily stronger and statistically significant as soon as 1997 - the next year. The correlation coefficient ranged from 0.1870 to 0.5215 ($p < .05$). All the associations were strategically significant, but there was no clear linear pattern increasing over time.
The results in Table 3, 4 and 5 show that the high-risk environments - the prevalence of drug abuse and commercial sex - were significantly associated with the prevalence of HIV/STDs. The results generally support hypothesis four and hypothesis five in this study: at the community level, the higher rates of drug abuse, the higher the prevalence of HIV/STDs; the higher rates of commercial sex, the higher the prevalence of HIV/STDs.

Contained in Table 6 are the findings about the association between the number of temporary migrants and the prevalence of HIV/STDs in a whole community, and the prevalence of HIV among non-migrant residents in a community. The results show that except in 1996, the number of temporary migrants per 1,000 permanent residents in a community by year was positively associated with the prevalence of HIV in a community. The correlation coefficients ranged from 0.2823 to 0.3304 ($p < .01$). The association between the number of temporary migrants per 1,000 permanent residents and the prevalence of STDs was not significant in the year 1996 and 1997. However, significant

and positive associations do appear from 1998 to 2000, with correlation coefficients of 0.2569, 0.4984 and 0.4173, respectively ($p < .01$). The findings partially support hypothesis five that with a higher level of temporary migration is associated with a higher rate of HIV/STDs.

Regarding the association between the number of temporary migrants per 1,000 permanent residents and the prevalence of HIV among non-migrant residents, a consistently significant association is found from the results in Table 6. The correlation coefficients ranged from 0.1847 to 0.4406. The relationship was moderately significantly in 1996 ($p < .05$) and highly significant from 1997 to 2000 ($p < .01$). As expected, the findings support hypothesis six: a higher level of temporary migration is associated with a higher rate of HIV infection among non-migrant residents.

Table 6. County/City Level Correlation Coefficients between the Number of Temporary Migrants Per 1,000 Permanent Residents and the Prevalence of HIV/STDs in a Community and the Prevalence of HIV among Non-migrant Residents in a Community, 1996-2000

HIV/STD Indices	Number of Temporary Migrants per 1, 000 Permanent Residents				
	1996	1997	1998	1999	2000
HIV in a	0.1528	0.2823**	0.4092**	0.4437**	0.3304**
Community	(126)	(126)	(126)	(126)	(126)
STDs in a	-0.0097	0.0967	0.2569**	0.4984**	0.4137**
Community	(126)	(126)	(126)	(126)	(126)
HIV among	0.1847*	0.2670**	0.4034**	0.4406**	0.3318**
Non-migrant	(126)	(126)	(126)	(126)	(126)
Residents					

Notes: Number in parentheses is numbers of valid observations.
*p < .05. **p < .01

CHAPTER V

DISCUSSION AND CONCLUSION

This research examines six hypotheses and tests four questions in regard to the relationship between population mobility and the diffusion of HIV/STD based on the data collected in a community level survey. This chapter elaborates the findings presented in the previous chapter. Additionally, the implications of the research as well as the recommendations for future research are presented in this part.

DISCUSSION OF THE RESULTS

The impact of population mobility on the spread of HIV/STDs has been frequently implicated (Yang 2002a, 2002b; Zhang and Ma 2002); however, the association at the macro-level has not been well examined in China. The focus of this study is to investigate the macro-level association between temporary migration and the diffusion of HIV/STDs, and with the consideration of commercial sex and drug abuse. The results in Chapter four generally support the hypotheses in this study.

Bivariate results in correlation analysis in this study first show that population mobility is positively correlated with the prevalence of drug abuse, the prevalence of commercial sex. As stated in chapter II, temporary migrants are more likely to engage in casual sex or illicit drugs use, faced with the new situation during or after migration. Some may even seek the quick money in the sex trade or drug trafficking to support their life style. So, it can be expected that there is a connection between temporary migration and the prevalence of drug abuse and commercial sex, as the former is associated with a

higher availability to illicit drug and commercial sex in a community. Furthermore, the behaviors of these "risk takers" may set a real life example for the other people to follow and possibly result in comparatively less punitive social norms to these deviant behaviors. Therefore, in the community where more temporary migrants are registered, the more drug abuse and commercial sex incidences are detained.

Second, the results in Table 3, Table 4 and Table 5 show that the prevalence of drug abuse and the prevalence of commercial sex are positively associated with the prevalence of HIV/STDs in a community. Both drug abuse and commercial sex are high-risk behaviors, which may lead to high rates of HIV/STD infection of the individual. As stated above, the prevalence of these behaviors in a community may increase the general residents' probability of engaging in these behaviors, and may, therefore, be associated with a higher risk of HIV/STD infection. It is not surprising that the prevalence of drug abuse and commercial sex are significant factors predicting the prevalence of HIV/STDs in a community. Furthermore, based on the findings in Table 2, the prevalence of drug abuse and commercial sex are highly positively associated with the proportion of temporary migrants in a community. Therefore, it may be suggested that there is an indirect connection between temporary migration and the prevalence of HIV/STDs in a community due to its association with the prevalence of drug abuse and commercial sex.

Third, significant and positive relationships between the level of temporary migration and the prevalence of HIV/STDs in a community and the prevalence of HIV among non-migrant residents are also discovered in this study. It might be the result of the migration-induced prevalence of drug abuse and commercial sex as stated in the previous section. It might also be a direct consequence of temporary migration.

Temporary migrants are among the most marginalized groups in contemporary Chinese society. As discussed earlier, temporary migrants are generally more likely to be infected by HIV/STD. The resulting pool of infectious agents in a community may lead to higher exposure of the local residents to the virus. One might be infected through sexual behavior with regular sexual partners or through some other behaviors, which may unwittingly involve in the contact of bodily fluids. Moreover, temporary migration provides the social and geographical networks for the virus to spread to other populations and other geographical areas. As expected, in a community where more temporary migrants were registered, the more HIV/STD incidences were reported even among non-migrant residents. Therefore, temporary migration may also be an independent factor, which may be directly associated with the prevalence of HIV/STDs among the general population.

In all, based on the findings in this study, several conclusions can be made. First, There is a connection between temporary migration and the prevalence of HIV/STDs among the general population, as temporary migration is association with the prevalence of drug abuse and commercial sex. Furthermore, at a community level, temporary migration may actually be an independent factor, which is directly associated with the diffusion of HIV/STDs among the general population.

However, even though the results in this study generally support the hypotheses, the relationships found could still be questioned. First, based on the government report and the information from other sources, temporary migration, HIV/STD incidences, drug abuse and commercial sex are continuously increasing in recent years (United Nations Theme Group 2002). However, the univariate statistics fail to reveal a clear increasing

trend over time. The main reason is probably that all the important data in this study, including migrant population, HIV/STD incidences, drug use and commercial sex activities were collected based on the reported cases, all of which are believed to be greatly underreported (United Nations Theme Group 2002).

For example, even the current STD statistic is believed to be a serious underestimate of the real STD epidemic (Ministry of Health Center for AIDS Prevention and Control and National Center for STD and Leprosy Control 2001; United Nations Theme Group 2002). First, many people in China are not seeking private help for STDs, and thus are not registered. Second, the public STD clinics do not always report notifiable STDs correctly to local and provincial surveillance sites. It was found that among the 4,647 notifiable STD cases in Gansu province in the west of China, only 924 had been reported to the relevant administrative institutions (Yu 1999). According to a survey, the underreporting rate ranged from 100% in private clinics to 33% in military hospitals (Ministry of Health Center for AIDS Prevention and Control and National Center for STD and Leprosy Control 2001). Furthermore, it cannot be expected that the rate of underreporting would be evenly distributed over time and space. Thus, the numbers recorded in this study may fail to catch the real situation and exact trends over time and geographical areas.

Furthermore, the HIV trends in China are estimated through the national and provincial sentinel surveillance systems, which began operation in 1995. This system is not at all complete and has a lot of problems. There are a huge number of underreported cases due to the lack of testing equipment, the lack of trained health stuff and the lack of voluntary testing and counseling services (United Nations Theme Group 2002).

Meanwhile, the collection of data is carried out twice a year mainly among five population groups: STD patients, prostitutes, drug users, truck drivers and pregnant women, since in the earlier stage, the infections often clustered in those most vulnerable populations (Joint United Nations Programme on HIV/AIDS 2002). So the data collected in this study were less likely to represent the real situation of HIV prevalence among the general population.

Moreover, as having been stated before, only bivarriate analysis was performed in this study. Compounding factors, which may be associated with both temporary migration and the spread of HIV/STDs, such as poverty, the great disparity between rural and urban in China, social inequality and gender inequality, were not controlled in this study. Furthermore, the other methodological limitations, including the replacement of the missing values, the level of aggregation and the direct aggregation of index values in this study, may have introduced biases in the data.

Due to the above reasons, even though significant associations between population mobility, drug use, commercial sex and the diffusion of HIV/STDs are supported by the results in this study, the conclusions can still be questioned. Therefore, further systematic research should be continued in order to better understand the macro-level association between population mobility, drug use, commercial sex and the diffusion of HIV/STDs in China. This is also the requirement for the generalization of the findings from this study to the other provinces in China or the other countries in the world.

IMPLICATIONS

Despite the limitations, this study does suggest that temporary migration in China has institutionalized a network of relationships for the rapid diffusion of HIV/STDs. Temporary migration, migration-induced high prevalence of drug abuse and commercial sex, may exactly be the high-risk environments, which are responsible for the rapid diffusion of HIV/STDs in contemporary China. The findings have both theoretical and practical significance for the understanding of HIV/STD epidemics in contemporary Chinese society.

In the earlier study, geographical mobility, migration, and widespread population displacement was identified as significant risk factors in the transmission of HIV, with a focus mainly concentrated on its impact on migrants' vulnerability (Jochelson et al. 1991; Decosas et al. 1995; Mishra et al. 1996; Organista and Organista 1997; Brockerhoff and Biddlecom 1999; Yang 2002a). However, our preliminary findings in this study point to the devastating and destructive effects of temporary migration system on the whole of society, not just on the temporary migrants themselves. It reveals the potential dynamics for the diffusion of HIV/STDs among the general population in the society. Given the trend of temporary migration and the rapid diffusion of HIV/STDs in China, there is an urgent need to address the association by focusing on the related social and contextual reality.

This study also points to the urgent need for establishing effective preventive interventions to halt the epidemic spread of HIV/STDs. Though the statistical basis in this study may not allow us to make significant generalization to other populations or other provinces, it is reasonable to expect what happened in this province might be

happening in other provinces in China. Though the national overall prevalence rate of HIV in China is still low according to the official reports (0.2%), the reported number of infected, which may still be a serious underreport, has been over one million (Xinhua News Agency 2002). Furthermore, the present STD epidemic could greatly magnify the risk of HIV transmission if it were left unattended. In addition to the role that the continuingly increasing large-scale temporary migration may play in HIV/STD epidemic, China, which is the home to 60 percent of world population, may be at the brink of explosive HIV epidemics with an imminent risk to the widespread dissemination of HIV to the general population (United Nations Theme Group 2002). AIDS would possibly become a national disaster, which could result in unimaginable human suffering, economic loss and social devastation. Therefore, operational research and the application of effective prevention programs are urgently needed to minimize the potential harm of HIV/STDs on the mass population.

In China, temporary migrants, drug addicts and commercial sex workers are all socially and economically marginalized people from rural areas. They are generally at a higher risk of being infected due to the situations they are experiencing. Due to stigma and discrimination, they are often hard-to-reach when it comes to support and prevention (Stephenson 2001). However, some action taken by the government agencies to curtail the spread of HIV/AIDS have had negative effects (Dorgan 2002). It has been shown that despite the strict anti-drug and anti-prostitution laws, both drug abuse and commercial sex trade are observably on the rise (Anneke et al. 2001; Zhang et al. 2002). Furthermore, the vast majority of the Chinese population lacks basic knowledge and skills for protection from future infection and for dealing with people already infected

(United Nations Theme Group 2002). Therefore, the probability of rapid spread of HIV/STDs to the general population is greatly enhanced.

Faced with this situation, more supportive social environments should be provided for temporary migrants in the places of destination. For example, more job chances and better social welfare should be provided to the temporary migrants, which could be expected to reduce the prevalence of drug abuse and commercial sex, and in turn contribute to HIV/STDs prevention. Furthermore, the harm reduction programs, such as 100% condom use in commercial sex settings and needle exchange programs for IDUs, should be promoted on a nationwide scale, combined with drug education and drug detoxification for drug addicts and the reeducation of CSWs (Normile 2000).

The study also suggests that HIV/STD transmission cannot be curtailed unless prevention strategies are targeted on the social conditions facilitating its spread. No health behavior is under the complete control of the individual as no individual can be free from the influence of the environment. Human behavior including HIV/STD risk-taking behaviors are not inborn, but are learned through socialization and interaction with other people within the environment. Previously, the perception of AIDs as a disease of the individual had dominated the prevention efforts. Such efforts usually involved increasing personal awareness and risk perception, raising expectation of favorable outcomes of risk avoidance and so on (Diclementa and Peterson 1994; Zhang et al. 1999). However, those approaches, which focus on solely individual behavior, do not have the expected results as it overlooks the social, economic and contextual factors that may lead to the risky behaviors and therefore facilitate the transmission of HIV/STDs. Without emphasizing the high-risk environments, such as population migration, and migration-

induced prevalence of drug abuse and commercial sex in this study, behavioral change intervention would not be effective in combating the HIV epidemic.

DIRECTIONS FOR FUTURE RESEARCH

The central theme of this study is the high-risk environment, which may facilitate the spread of HIV/STDs among general population. It also implicates the directions for the future research. Over time, it has been increasingly acknowledged that the prevalence of HIV/STD infection does not progress within populations in uniform and random ways, but is subject to the relativity of risk and to variations in population behavior in different social, cultural, economic, policy and political environments (Sweat and Denison 1995; Tawil et al. 1995; Rhodes et al. 1999a; Atlani et al. 2000). Though the HIV/STD infection of individual is mostly related to certain risky behaviors, the HIV/STD epidemic is actually fueled by the social and contextual environments, (Sweat and Denison 1995; Diez-Roux 1998). The focus on the environmental dimension of health is especially important in understanding the distribution and determinants of behavioral diseases. An understanding of the contextual environments mediating HIV is a prerequisite to identifying the preconditions of HIV/STDs outbreak, and for predicting and preventing HIV transmission (Rhodes et al. 1999b; Atlani et al. 2000).

For example, as implicated in this study, temporary migration is one of the most fundamental risk environments for the prevalence of HIV/STDs, as it is first associated with the prevalence of drug abuse and commercial sex. Furthermore, it may also provide the social and geographic network for the virus to spread. Therefore, in a community where an upsurge of temporary migration is observed, the corresponding preventive

measures should be taken before the outbreak of HIV/STDs happens, which would be more effective in controlling the further diffusion of HIV/STDs. The other social and contextual situations, such as poverty, gender inequality, lack of information and education, low awareness of HIV/STD infection, the severe stigma and discrimination against people infected or affected by HIV, are all shaping the potential HIV/STD epidemics that lies in wait (Cohen et al. 1996; Liao et al. 1997).

However, HIV/STD prevention remains a predominantly individualistic exercise, which concentrates on individual determinants of risk such as knowledge, attitude, and behavior (Diclementa and Peterson 1994; Gibney, DiClemente and Vermund 1999; Auerach 1998). Though it is important to target individuals in attempting to prevent HIV/STD infection, those approaches often miss the environmental influence on HIV/STDs spread and the potential for social and environmental change, and thus, turn out to be ineffective in halting the epidemic spread of HIV/STDs.

Therefore, there is an increasing need for further research and prevention strategies to recognize the socioeconomic determinants of diseases patterns for the rapid HIV spread to occur. At the macro-level, the environmental factors are responsible more for the spread of HIV/STD infection by influencing the personal decisions about certain behaviors and the probability of engaging in these behaviors (Sweat and Denison 1995; Tawil et al. 1996). Rather than condemning individual behavior, a strategy must situate those risky behaviors in its social context, which involves the reexamination of social structures conducive to high-risk behaviors. Intervention on the environmental level could ensure the effectiveness of preventive approaches, as modifying environments can greatly contribute the large-scale reduction of risks (Tawil et al. 1995; Sweat and Denison

1995; Sumartijo 2000). The risk environment remains an under researched area, yet critical for the development of HIV/STD prevention in China and elsewhere in the world.

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