HIV/AIDS behavioral surveillance among men who have sex with men in China

—community and Internet based surveys

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**ABBREVIATIONS**

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<th>Description</th>
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<tr>
<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<tr>
<td>BSS</td>
<td>Behavioral Surveillance System</td>
</tr>
<tr>
<td>CCMD-3</td>
<td>Chinese Category of Mental Diseases-3</td>
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<tr>
<td>DU</td>
<td>Drug User</td>
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<tr>
<td>ELISA</td>
<td>Enzyme-linked Immunosorbent Assay</td>
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<td>FHI</td>
<td>Family Health International</td>
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<td>FSW</td>
<td>Female Sex Worker</td>
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<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>IDU</td>
<td>Injecting Drug User</td>
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<tr>
<td>ICF</td>
<td>Informed Consent Form</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>MSM</td>
<td>Men Who have Sex with Men</td>
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<tr>
<td>NCAIDS</td>
<td>National Centre for HIV/AIDS Prevention and Control</td>
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<tr>
<td>PLWHA</td>
<td>People Living with HIV/AIDS</td>
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<tr>
<td>STD</td>
<td>Sexually Transmitted Diseases</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually Transmitted Infections</td>
</tr>
<tr>
<td>UAI</td>
<td>Unprotected Anal Intercourse</td>
</tr>
<tr>
<td>UNAIDS</td>
<td>Joint United Nations Program on HIV/AIDS</td>
</tr>
<tr>
<td>UNGASS</td>
<td>The United Nations General Assembly Special Session on HIV/AIDS</td>
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<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

BACKGROUND

The coverage of HIV/AIDS behavioral surveillance among MSM in China falls far short of what is necessary as the current approach is expensive and time consuming. In addition MSM are difficult to reach in China. Internet-based behavioral surveys have demonstrated a number of advantages compared with the traditional paper-pen method. Chinese MSM are avid users of the Internet. Use of the internet provides an opportunity to access this hard-to-reach population and explore their use of the Internet for sexual purposes as well as to assess risk behaviors among MSM internet users. This thesis aimed to explore the trends in risk behaviors and HIV prevalence among MSM using traditional community-based surveys and Internet surveys, and to analyze the potential of web-based behavioral surveillance among MSM by comparing the differences between Internet and community-based MSM samples, and then to provide insights for the future HIV/AIDS behavioral surveillance, epidemic estimation and prediction as well as health intervention among the Chinese MSM population.

METHODS

This study has three components. The first focuses on trends in HIV risk behaviors and prevalence among MSM in Harbin in northeast China, based on community-based surveys. Eligible participants were approached by peer recruiters in traditional gay venues and then interviewed by health professionals with a standard questionnaire. Urine samples were collected to screen their HIV status.
The second part presents two cross-sectional, Internet-based surveys among MSM in China in 2006 and 2007. The study website was advertised on three selected gay websites using a series of banners, pop-ups and text notifications. After providing consent to the survey, eligible participants were invited to complete an online questionnaire.

The third component compares the demographic characteristics and risk behaviors of two samples of Chinese MSM. Participants living in Heilongjiang Province were extracted from the 2006 online survey dataset to compare with the community sample of MSM recruited in Harbin, the capital city of Heilongjiang Province in the same year.

**KEY FINDINGS**

*Community-based behavioral surveillance*

Among MSM in Harbin, a trend was observed towards more self-identifying as homosexual (from 58% to 80%) and more living with a male partner (from 12% to 41%) over the study period 2002-06.

Although there was a trend towards a reduction in the rate of never using a condom and an increase in the rate of always using condoms during anal sex in the past six months, the prevalence of unprotected anal intercourse (UAI) still remained at high level (from 90% in 2002 to 72% in 2006). Most respondents reported having multiple male sexual partners (≥ 2) in the past six months: 86.5% in 2002, 76.0% in 2004 and 91.6% in 2006.
The HIV prevalence (2.2%, 15/674) among MSM in Harbin in 2006 was higher than that in previous survey years (1.3% in 2002 and 0.94% in 2004), but no statistically significant change was detected.

**Internet-based behavioral surveys**

Gay website users in China are young and well educated. The majority (85%) have used the Internet to seek sex and meeting sexual partners online, which is one of the most common reasons for visiting gay websites. Traditional gay venues still play an important role in the sex seeking process, especially for MSM who are older and less educated.

Gay website users are vulnerable to HIV/AIDS given their high prevalence of UAI (56.6%) and multiple male sexual partners (66.5%). The type of partners plays an important role in determining consistent condom use. An increase in condom use was observed among MSM having sex between commercial partners relative to those having sex with non-regular partners and regular partners.

Among the Internet sample, participants who have regular partners are less likely to have sex with females, less likely to have multiple partners and less likely to engage in commercial sex behaviors than those who do not.

**Comparisons between Internet and community samples**

There are significant differences in terms of demographic characteristics and risk behaviors between the Internet and community samples of MSM. The Internet sample was significantly younger, more educated and more likely to be students and self identify as homosexual.
Among those who had anal sex in the past six months, the Internet sample tended to use condoms less consistently than the community sample. However, using the total sample size as the denominator to calculate the prevalence of UAI, no significant difference between the two samples was observed ($AOR$ 1.02, $CI$ 0.73-1.43, $p = 0.905$).

After adjusting for differences in demographic characteristics, the community sample was more likely to have had sex with females ($AOR$ 2.01, $CI$ 1.22-3.30, $p = 0.006$) and have had ≥ 6 male partners in the previous six months than the Internet sample (46.1% vs. 20.2%; $AOR$ 4.88, $CI$ 3.51-6.80, $p < 0.001$). The mean number of male partners for the community sample was 13.5 ± 16.8, whereas it was 6.0 ± 12.2 for the Internet sample.

**CONCLUSIONS**

Although there is a trend towards an increase in condom use among MSM in China, they are vulnerable to HIV/AIDS infection given their high prevalence of UAI and multiple sexual partners. Public sector officials at all levels need to recognize this risk for HIV transmission. Health promotion and behavioral interventions should be enforced and scaled up to meet the need for controlling HIV transmission among MSM in China. Since the Internet has become a risk environment for MSM and the online MSM population is significantly different from the traditional community MSM group, online MSM should be included as a risk group in national HIV sentinel and behavioral surveillance and the coverage of surveillance for this specific group should be expanded to better understand the health promotion needs of this community as part of an HIV/AIDS strategy in China.
PUBLICATIONS DURING CANDIDATURE


DECLARATION

In order to track changes in risk behaviors and HIV prevalence among men who have sex with men in China, data based on two cross-sectional surveys that were conducted in 2002 and 2004 were used in this thesis to compare with the 2006 community-based survey. The 2002 and 2004 surveys were conducted by myself during the time when I was working in the China National Center for AIDS/STD Control and Prevention.

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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4. Dapeng Zhang, Peng Bi, Fan Lv, Houlin Tang, Jie Zhang and Janet E Hiller. Differences between Internet and community samples of men who have sex with men: implications for behavioral surveillance among MSM in China. AIDS Care. (Accepted 3 Dec 2007)

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INTRODUCTION

1. BACKGROUND

Since the first Acquired Immunodeficiency Syndrome (AIDS) case was diagnosed among men who have sex with men (MSM) in 1981, male-male sexual behaviors have played an important role in HIV/AIDS transmission [1-6]. Sustained efforts in diverse settings have helped to bring about decreases in risk behaviors and HIV incidence among this specific group in some developed countries [5, 7]. However, male-male sex is still the predominant HIV transmission mode in most European countries, North America, Australia and New Zealand [3, 8-10]. In Eastern Europe, based on limited available data, an HIV/AIDS epidemic among MSM seems to be emerging [11-13]. In some Asian countries, where the HIV/AIDS epidemic started later than Western countries, high-risk sexual behaviors for HIV transmission in MSM have been widely identified [11-14]. No conclusion or inference about the effect of current education and interventions among MSM can be drawn due to the absence of systematic surveillance data [11-14]. According to global available data, estimates in HIV prevalence among MSM vary widely by country and region, from almost 0% in the Middle East to around 36.5% in Latin America [15].

The increased risk for acquiring and transmitting HIV in MSM can be attributed to a complex set of biological, behavioral, and socio-cultural factors. Although both vaginal and anal intercourse have been shown to be efficient for HIV transmission, the
Introduction

biological nature of rectal tissue, which has larger surface area and is more vulnerable to tearing during anal sex, provides more opportunities for HIV penetration and infection [15]. It is believed that unprotected receptive anal intercourse is at least ten times more likely to result in infection with HIV than unprotected receptive vaginal intercourse [15]. The presence of genital ulcer disease, such as syphilis and chancroid, also fuels HIV transmission and acquisition. Risk sexual behaviors, such as unprotected anal intercourse (UAI) and multiple sexual partners, are probably the most widely documented behaviors that put MSM at higher risk for HIV infection [16]. The other behavioral factors, including lack of HIV knowledge, drug/alcohol use, depression, a history of childhood abuse and seeking sex online, may all lead to increased risk of HIV infection [15]. In terms of socio-cultural factors, stigmatization and discrimination of homosexuality, perceptions and experience of homophobia and racism may all increase the vulnerability of MSM to HIV infection [15, 17].

It is neither feasible nor necessary to change the biological nature relating to male-male anal intercourse. Changing social-cultural factors that contribute to HIV transmission among MSM such as discrimination and stigmatization is difficult and needs time to take effect. Changing risk behaviors that facilitate HIV transmission among MSM themselves may be the most feasible and practical choice to control the spread of HIV [16]. Most intervention efforts among MSM have been aimed at reducing the number of sexual partners and increasing the use of condoms [16]. Surveillance of risk behaviors among MSM is increasingly important to identify risk sub-groups, track changes in behaviors and evaluation the effect of prevention and intervention programs [16, 18].
Public health surveillance is “the ongoing systematic collection, analysis, and interpretation of health data, closely integrated with the timely dissemination of these data to those providing the data and to those who can apply the data to control and prevention programs” [19]. In keeping with this definition, HIV/AIDS surveillance also addresses systematic data collection and dissemination of analytic data to those who need so that action can be taken. However, since the advent of the HIV epidemic, the HIV/AIDS surveillance approach has been changing with the improvement in the understanding of HIV transmission and in the focus of HIV prevention and intervention. From early in the HIV epidemic, many countries concentrated resources on tracking the spread of the virus itself [18]. Industrialised countries focused on HIV/AIDS case reporting, while some developing countries following a recommendation by the WHO set up sentinel surveillance systems, including China, India, Thailand, and some countries in sub-Saharan Africa. Sentinel surveillance tracks the changes in HIV prevalence. Because HIV prevalence reflects both cumulative HIV incidence and mortality and it will only respond slowly to changes in risk behavior, it may not serve as a good indicator of changes in new infections or as a measure of success of intervention programs which are designed to reduce new infections[20]. In places where HIV infection is relatively uncommon, stable or falling prevalence may mean fewer new infections or more deaths, or simply mean that the virus has not reached a critical mass in specific population. If risk behaviors do exist, recording HIV prevalence itself may make health professionals lose the opportunity to plan primary prevention programs to stop the spreading of the virus through a population with risk behaviors.
As an updated approach, the Jointed United Nation Programmes on AIDS (UNIADS)/WHO HIV surveillance working group in collaboration with other international partners advocated the implementation of “second generation surveillance” [18]. One of the key features of this strategy is to monitor changes in risk behavior (behavioral surveillance) and patterns of other sexually transmitted diseases. However, behavioral surveillance among MSM, which requires repeated cross-sectional surveys based on replicable study designs, is difficult in many countries. Common challenges include validity of self-reported data on sexual behaviors and illegal activities [20], time and resources required to collect such data, and linking behavioral and serological data for better explanatory power. In addition, one of the most important challenges in conducting behavioral surveillance among MSM is that it is difficult to reach them, especially in a socio-cultural context with stigma and discrimination, such as in China [17, 18, 20, 21]. These factors affect the quality and completeness of behavioral surveillance among the MSM population [22]. In 2000, Family Health International published *Guidelines for repeated behavioral surveys in populations at risk for HIV*, in which the important roles of behavioral surveillance surveys (BBS) were summarized as follows [23].

1. BBS can serve as an early warning system. It can help to identify sub-populations at higher risk in terms of occupation, sexual orientation, age group or other factors, to examine sexual links between groups with higher risk of infection and groups with lower risk, and then suggest the pathways that the virus might follow [24].

2. BBS can provide information to inform program design. Behavioral data can indicate who is most at risk of acquiring or transmitting HIV, and why, then
enable health officials to prioritize interventions [3].

3. BBS can track changes in behaviors and then help evaluate the effect of prevention programs. The goal of behavioral intervention is to encourage people to adopt safer behaviors. These changes can give an indication of the success of activities aimed to promoting safe behavior [18].

4. Changes in behavior can help explain, at least in part, changes in HIV prevalence. A complex set of factors may contribute to changes in HIV infections. Without collecting data showing trends in risk behaviors, however, it is not possible for us to ascertain whether behavior change contributes to changes in prevalence [18].

With the development of communication technologies, a new meeting place, the Internet, provides a perfect channel—a virtual venue—for MSM. As documented in some surveys, MSM are avid users of the Internet, and seeking sex via the Internet is very common among them [18, 25, 26]. Mainstream Internet providers are providing more and more friendly services catering to MSM for their dating and sexual purposes [27]. However, while gay men enjoy the convenience of seeking sex on the Internet, they may also suffer from a high risk of being infected with sexually transmitted diseases (STD) including HIV/AIDS [28-31]. Researchers have branded the Internet as an “emerging risk environment” for HIV/STI transmission [31, 32]. This “emerging risk environment”, on the other hand, also provides an excellent opportunity for health professionals to use the Internet to monitor risky sexual behaviors and conduct health intervention.

Compared with behavioral surveys in traditional gay venues, such as gay bars, public bath houses, public toilets and parks, Internet-based surveys are more cost-effective,
have more potential respondents, and allow respondents to answer questions anonymously therefore maintaining their privacy [28, 31, 33, 34].

Although a large number of Internet-based cross-sectional surveys and studies have been conducted among MSM in developed countries, no studies have been performed in China in this endeavour. The potential emerging meeting venue for Chinese gay/bisexual men raises a number of important, yet unanswered questions. What are the demographic characteristics of those MSM who use the Internet for sexual purposes? How often do Chinese MSM seek sex through the Internet? Are they more likely to have high-risk sexual behaviors than those who seek sex in traditional gay venues? Is the Internet becoming a new risk environment for HIV transmission among them? What role can the Internet play both in behavioral surveillance and creating a risk environment? Answers to these questions are important for the development of a Chinese HIV/AIDS behavioral surveillance system. It can also provide necessary information for HIV prevention and sexual health promotion among Chinese MSM in an Internet era.

The coverage of HIV/AIDS behavioral surveillance among MSM in China falls far short of what is necessary as the current approach is expensive and time consuming. This thesis aims to examine the trends in risk behaviors and HIV prevalence among MSM in China using traditional community-based surveys and Internet surveys, to explore the potential of web-based behavioral surveillance among MSM by comparing the differences between Internet and community-based MSM samples, and to provide policy implications and suggestions for governments and NGOs for behavioral surveillance and health intervention among the Chinese MSM population.
Introduction

2. RESEARCH QUESTIONS

I. What is the trend in risk behaviors and HIV prevalence rate among MSM in Harbin, a selected study site in northern China?

II. Does the Internet represent a new risk environment for HIV infection and transmission for men who have sex with men in China?

III. What are the differences in demographic characteristics and risk behaviors between Internet and community samples of men who have sex with men in Harbin?

IV. What role can the Internet play both in behavioral surveillance among MSM and in creating a new risk environment in China?

3. FRAMEWORK OF THIS THESIS

The aim of this research was to explore changes in risk behaviors and use of the Internet for sexual purposes among MSM in China, to compare differences between Internet and community based samples, and therefore to provide insights for the future HIV/AIDS behavioral surveillance, epidemic estimation and prediction as well as health intervention among the Chinese MSM population.

This thesis consists of five major components:
3.1 Chapter One: Literature review

Chapter One presents a literature review which addresses the HIV/AIDS epidemic among MSM in China as well as the advantages and challenges of Internet-based behavioral surveillance among MSM.

3.2 Chapter Two: Community-based surveillance

Chapter Two focuses on trends in HIV/AIDS risk behaviors and prevalence among MSM in Harbin, based on community-based surveys which addressed Research Question One. The main aim is to examine changes in risk behaviors and HIV prevalence and to provide policy and practice recommendations for HIV/AIDS prevention and intervention in this population. Three community-based cross-sectional surveys were conducted based on the same protocol and methodology in 2002, 2004 and 2006. Men who were eligible were interviewed with a standard questionnaire. Urine samples were collected to test their HIV status.

The objectives of this project were to explore the changes in risk behaviors and other factors that related to HIV transmission among the community-based samples of MSM in Harbin including:

- Self-identified sexual orientation
- Age at first sex
- Having sex with both males and females;
- Unprotected anal intercourse and the number of sexual partners;
- Illicit drug use
- History of STDs
3.3 Chapter Three: Internet-based behavioral surveys

Chapter Three presents research results of two anonymous, cross-sectional, Internet-based surveys among MSM in China. A study website was developed and was advertised on several popular Chinese gay websites between April and July in 2006 and 2007. The aims of this study were to examine HIV/AIDS risk behaviors among Chinese gay website users and to compare aspects of sex seeking on the Internet and in traditional gay venues among the Chinese MSM population. The findings provide evidence for the development of an HIV/AIDS behavioral surveillance system, as well as for future directions for minimizing the HIV transmission risk in the Internet era. This project addressed the Research Question Two.

The objectives of this study were to:

- Examine the demographic characteristics of Chinese gay website users;
- Explore the behaviors of gay website users including
  - UAI and the number of sexual partners;
  - Differences in condom use consistency between different sexual partnerships;
  - Whether men having a regular partner carry a lower risk for HIV infection than others;
  - Reasons for not using condoms during anal sex;
  - The extent to which Chinese gay website users seek sex on the Internet;
  - Use of the Internet and reasons for using the Internet for sexual purpose;
- Examine whether men who seek sex on the Internet are at higher risk for HIV infection than others who seek sex in traditional gay venues or in other ways;
3.4 Chapter Four: Comparison between Internet and community MSM samples

Chapter Four compared the demographics and risk behaviors of two samples of men who have sex with men (MSM) in Harbin, China, using cross-sectional data that were collected via the Internet and through conventional venue-based outreach. The community sample was from the community survey conducted in Harbin in 2006, which was introduced in Chapter Two. The Internet sample consisted of MSM living in Heilongjiang province from the 2006 online survey, as described in Chapter Three. This project addressed the Research Question Three.

The objectives of this study were to:

- Compare the differences in demographic characteristics and risk behaviors between an Internet and community sample of MSM.
- Explore the overlap between the two samples in terms of venues of seeking sex.

3.5 Chapter Five: Conclusions and Recommendations

The final chapter, Chapter Five, summarizes the key findings of this thesis, presents conclusions and recommendations based on research results, discusses the role that the Internet can play both in creating a new risk environment and in behavioral surveillance, and provides future directions for research to address actions that need to be taken for HIV/AIDS prevention and intervention among MSM in China. This chapter addressed the Research Question Four.
CHAPTER ONE

LITERATURE REVIEW

—Internet-based HIV/AIDS behavioral surveillance among men who have sex with men: Potential and challenges
1.1 INTRODUCTION

China is facing an emerging HIV/AIDS epidemic among men who have sex with men (MSM) [35-39]. Successful HIV prevention among this group depends on changing risk behaviors that put them at high risk for HIV [40]. This mainly includes increasing condom use, reducing the numbers of sexual partners, reducing needle-sharing behavior and delaying the onset of first intercourse [17, 41, 42]. In order to promote behavioral changes, evidence-based behavioral information is needed to guide the design of appropriate health prevention programs and to monitor and evaluate whether these efforts are successful and cost-effective [38, 42]. Systematic surveillance of risk behaviors over time among MSM can provide important information for better understanding an HIV/AIDS epidemic in the community, predicting incidence and planning intervention programmes [18, 43].

The Internet has been branded as an “emerging risk environment” for HIV transmission. Studies indicate that MSM who seek sex on the Internet are at higher risk for HIV than those who do not. In addition, with more people accessing the Internet around the world, it provides a perfect channel—a virtual venue—for MSM to seek sexual partners. The anonymity and complete privacy characterized by the Internet also offer unique practical capabilities in conducting online surveys compared with conventional survey methods (e.g., the telephone, mail, and face-to-face interview) [18, 20].

For this review, Medline and recent AIDS conference publications have been searched by using key words “MSM or gay”, “Internet or Web”, “HIV/AIDS” and “China”. This review focuses on three issues which are detailed as follows including HIV/AIDS
epidemic in China, MSM and HIV/AIDS in China, and the Internet as an emerging risk environment for HIV transmission and as a tool to collect behavioral data.

1.2 HIV/AIDS IN CHINA

Several published reviews [3, 16, 44-48] and reports issued by the Chinese government and international organizations [49-51] have examined the HIV/AIDS epidemic in China. China’s HIV/AIDS epidemic has entered its third stage [52]: from the beginning when most infections were in foreigners, to the second stage when outbreaks were found among injecting drug users in Yunnan and Xinjiang provinces [53, 54] and among former blood/plasma donors in central China [52, 55], to the third stage in which sexual transmission is playing an important role in the spread of HIV/AIDS [48, 50, 56]. After two decades fighting against the disease, the HIV epidemic is still spreading at a high rate in China [57-59].

1.2.1 The number of notified HIV infections has been increasing significantly. However, it does not necessarily reflect the true increase in the epidemic considering HIV testing promotion in China.

By the end of October 2007, a total of 223,501 people had been officially reported to have contracted HIV from just one case in 1985 [53], with an average increase rate of 30% per annum [53]. The increase in the number of notified HIV infections in 2001 was 58%, almost twice as much as the previous year [52]. In 2003 the number increased as much as 123% compared to that in 2002 (Figure 1-1). Some organizations have made projections based on such increasing rates that “the disease, if left unchecked, could afflict 10 million Chinese by 2010” [46, 55].
However, looking only at numbers of notified HIV cases might give a misleading impression, especially in China with increasing responses to a HIV/AIDS epidemic. Several issues need to be considered. The first is the continuing improvement of the disease notification system. In 2004, the Chinese government amended the “Infectious Disease Prevention Law”, whereby many extra institutions were required to notify HIV/AIDS infections. Accordingly a new Internet-based infectious disease reporting system was developed in 2005. This endeavour significantly improved the quality of infectious disease notification. The second is the rapid improvement in HIV testing technology. Due to the lack of testing laboratories and equipment, the lack of trained health staff and the lack of knowledge about HIV, a large number of people were never tested for HIV in the early stage of the HIV epidemic, especially those living in rural areas [52, 60]. There has been a gradual increase in the number of people seeking HIV tests in recent years. The number of HIV screening laboratories in China has increased from 1,995 in 2002 to 3,490 in 2004[53]. Furthermore since 2004, the Chinese government offered free HIV tests, free antivirus drugs to AIDS patients, free prevention of mother to child transmission of HIV and free schooling for AIDS orphans[50]. All of these actions promote early HIV testing, and therefore may contribute to the increase in notified HIV infections. The 2003 national campaign addressing HIV screening among high risk sub-populations in China also may be a major contribution to the substantial increase in notified HIV cases in 2003 and 2004 [49].
1.2.2 While the national HIV prevalence remains low, higher prevalence exists in certain regions among specific populations and HIV/AIDS is spreading to the general population in China.

In January 2006, there were 650,000 people were living with HIV in China, including about 75,000 AIDS patients. This figure was jointly estimated by the Chinese government along with WHO and UNAIDS (newly updated estimate: 700,000 cases by the end of 2007 [52]). Given a total population of 1.3 billion, the national HIV prevalence was around 0.05% (CI 0.04-0.07%) [61], which is far lower than the rates in some African and Southeast Asian countries [62] (the prevalence rate is over 17% in all southern African countries, above 35% in Botswana [63] and 2.2% in Thailand [63]).

Looking at China’s overall national prevalence will give a misleading impression given the large population and variations within it [63]. The prevalence in some groups can be very high despite low national prevalence rates. China has attracted almost as many
concerns as the African countries have because of the increasing rates in specific regions and populations.

China’s HIV/AIDS epidemic is characterised by wide regional variation. The number of notified infections in the top six provinces (Yunnan, Henan, Guanxi, Xinjiang, Guangdong and Sichuan) accounts for over 80% of all notified infections [1]. Yunnan, bordering the Golden Triangle, is the first and also the worst affected province in China [2]. By the end of 2003, a total of 14,905 HIV cases had been notified in this province and the majority were among injecting drug users, in which the HIV prevalence ranged from 21.2% to 27.8% [64]. Sexual transmission in this province is increasing, as is indicated by the HIV prevalence among female sex workers (FSWs) ranging from 1.2% to 6.7% in 2003 [53, 63]. Drug use accompanied with the spread of HIV has extended along the trafficking routes to China’s Northwest Province of Xinjiang and Southeast Provinces of Sichuan, Guangxi and Guangdong [55]. In Guangdong Province, although the first HIV positive in injecting drug users (IDUs) was found at the end of 1996, the rate has been increasing alarmingly [65]. The notified HIV infections increased at an average rate of 86.2% from 1996 to 1999, and the proportion of HIV positives notified as injecting drug users increased from 1.4% before 1996 to 91.0% in 1999 [65]. Molecular epidemiological evidence has suggested that cooperation on drug control and disease prevention between countries along the drug traffic route from Burma and Laos, through northern Vietnam, to China's Guangxi Province, is crucial for the control of HIV spread through drug abuse [66].

In middle China, illegal blood or plasma collection using contaminated instruments in the early 1990s, caused a large number of HIV infections [56, 60, 66-68]. Procedures of
blood/plasma donation varied, but usually blood was taken for plasma, and the blood cells were returned along with a saline solution [69]. About 25,000 people were confirmed to be infected with HIV during blood donation in Henan Province—one of the provinces mostly affected by illegal blood/plasma collection in China [70]. Serious epidemics among blood donors were reported later in several other provinces including Shanxi, Hubei, Anhui, Hebei and Shanxi Province [57]. Since 1998, when the Chinese government passed the “Blood Donation Law” to ban the illegal commercial selling of blood and to standardise the procedures of blood donation and collection, HIV transmission through this route has ended [71]. HIV transmission within marriage and mother-to-child transmission, however, are becoming an issue [52, 57]. A study conducted in 2000 in a village of Henan Province, where commercial blood donation used to be popular, found that among 323 children aged less than 7 years old, 5% (17/323) were HIV positive [52]. Another study conducted in a place where HIV prevalence is high among former paid blood donors showed that fewer than 50% of the couples agree to use condoms consistently after knowing one of them was HIV positive [72]. The case reporting data show that the proportion of mother-to-child transmissions among notified HIV/AIDS cases increased from 0.1% in 1997 to 0.4% in 2002 and 1.2% in 2007 [56, 70]. In response to the epidemic among former paid blood donors, the Chinese government launched a national program called “China CARES (Comprehensive AIDS Responses)” in 2003 that was dedicated to stopping the transmission within families and offering free anti-HIV drugs to AIDS patients [56].

In China, the AIDS epidemic follows a chain of transmission similar to that in some Asian countries [70]. Usually an HIV epidemic happened firstly among injecting drug
users, followed by the spread among female sex workers. As the next link in the chain, clients of female sex workers transmit the virus to their female partners, and then the HIV virus enters the general population. As a sub-link in the chain, injecting drug users can also transmit the virus directly to their family members. HIV prevalence data among antenatal pregnant women in some provinces, where the epidemic is well established among injecting drug users, have indicated that the HIV epidemic has been spreading into the general population in China (Figure 1-2).
Chapter one: Literature review

Figure 1-2 Trend in HIV prevalence among antenatal pregnant women in four provinces
Source: Sentinel surveillance data-2004, China Centre for AIDS/STD Control and Prevention

NOTE:
This figure is included on page 19 of the print copy of the thesis held in the University of Adelaide Library.

Figure 1-3: Distribution of the Accumulated Notified AIDS Cases by the End of 2004.
Source: China Centre for AIDS/STD Control and Prevention

NOTE:
This figure is included on page 19 of the print copy of the thesis held in the University of Adelaide Library.
1.2.3 Although injecting drug users and former paid blood donors continually comprise the majority of HIV infections in China, unprotected sexual intercourse may be the most likely cause of an epidemic among the general population.

Accompanying the open-door policy of China in early 1980s, the commercial sex industry has re-emerged in China [52, 63]. Women living in rural areas may seek better income and migrate to metropolitan areas where some may become sex workers. Many social and economic reasons, including the growing income disparities, poverty and low education among women, consumerism caused by sudden wealth after living in poverty for a long time and the ease of earning money by selling sex, may all contribute to the boom in the sex trade [1, 57]. It is difficult to estimate the number of female sex workers (FSWs) in China [73] because selling sex is illegal and FSWs often work in entertainment establishments with legal working licenses. The Chinese Public Security Department (Police Department) estimated that there were between four and six million FSWs in China in 2000[74]. A study conducted in 2003 in China showed that there were approximately 17,500 FSWs working in a city with an urban population of 1.2 million [60]. There were 300,000 women sex workers working in Donguan in 2002, a city with six million inhabitants near the border with Hong Kong [73].

Modern Chinese society is becoming more tolerant to sex, but the awareness of the need to protect the population from sexual transmission infections (STI) has been left behind. Sentinel surveillance data show that the proportion of FSWs who never used a condom during commercial sex has decreased to lower than 15%, however, the rate of consistent condom use remains at a low level—of around 30% [73]. The HIV prevalence among FSWs increase from 0.02% in 1995 to 2% in 2000 (Figure 1-4) [62]. The sentinel surveillance results also indicated an increasing HIV prevalence among attendees of
STD clinics and antenatal clinics [75]. The burgeoning of the sex industry, the changes in sexual attitudes and the lack of protection awareness suggest the potential for HIV spreading through heterosexual transmission. Without effective intervention strategies, the HIV epidemic among the general population could be a real challenge.

1.2.4 Although “being mobile” in itself is not a risk factor for HIV, low education, being sexually active and absence of HIV/AIDS knowledge may make the “mobile population” vulnerable to HIV infection[74].

It was estimated that 140 million migrants (mobile population) left their original residence (mainly rural areas) and worked in a different place (metropolitan areas) in 2003 in China. This number, which accounts for almost 10% of the total population and 30% of rural labourers, is continually increasing accompanying the growing economy. The open nature of China's economy in recent decades has made it difficult to monitor and control internal migration [20]. Mobile populations are the most difficult to reach with preventive health education and they tend to be deprived of access of health care.
This mobile population is largely made up of young men and women with a poor education and low-paying jobs such as construction workers (for males) or waitresses (for females). They are separated from mainstream society and do jobs that the urban residents do not want to do. Some females become sex workers[76]. As they are separated from their spouses, sexual demand pushes some males to look for sex workers. The separation from the society may further make this “mobile population” vulnerable to being infected with STI/HIV.

1.3 HIV/AIDS SURVEILLANCE AMONG MSM IN CHINA

Social and political attitudes to homosexuality in China have changed dramatically since the late 1990s [52]. In 1987, the authorities stated that male-male sex violated morals and laws and it was unlikely that an HIV/AIDS epidemic could happen within this group since homosexuals were rare in China [52]. In 2001, this conservative attitude changed fundamentally when CCMD-3 (Chinese Category of Mental Diseases-3) deleted self-identified homosexuality from the official list of psychiatric disorders [62]. Prosecutions from Public Security Departments under anti-hooliganism laws, losing jobs from revealing homosexual orientation or discriminations from STD doctors are less likely to happen to MSM in China today. However, these changes in political opinions have had limited impact on public opinions about homosexuality in a short time [48]. Although homosexuality is more openly expressed and tolerated in China, men who have sex with men still are under social and family pressure [62]. Getting married, bearing children and raising a family have been becoming a pressure from families and relatives [17]. Stigma and discrimination against homosexuality still exists and forces most MSM to lead double lives.
1.3.1 How many MSM in China

It is very difficult to make an accurate estimation of the size of the MSM population in China. The reliability of size estimation of this population in China is influenced by several factors. (i) Some MSM lack knowledge and understanding of male-male sex behavioral patterns and have no conscious sexual identification/orientation; (ii) Many gay-identified MSM are reluctant to identify themselves as such and disclose their same-sex behavior to health care providers, fearing discrimination, stigma and exclusion [17]; (iii) Some MSM are afraid of disclosing same-sex behavior for legal reasons, such as male sex workers; (iv) There are limited possible ways to reach MSM. Currently although some are reached via traditional gay venues or the Internet, others cannot be accessed this way; and (v) MSM as a category is highly complex and diverse. Who is defined as a homosexual man and the definition of male-male sex are challenges for estimation of the population size? Does a single male-male sex encounter define an individual as MSM? How frequently does a male have sex with other males to be defined as MSM? Should risk to HIV infection be taken into account? [77]

Several studies in China have tried to estimate the size of the MSM population based on various methodologies and definitions of MSM. Some sociologists believe that there are about 10-20 million homosexual men in China, accounting for 2-4% of the adult male population [17], which is a similar proportion of homosexuals in its population as in the USA and some European countries [23]. A telephone survey of 15,230 Hong Kong Chinese men aged between 18 and 60 in 2003 found that 4.5% had ever had sex with men (anal, oral or masturbation) and 2.0% had such sex in the past six months [23]. An unpublished study conducted in a northeast city of China showed that there were about
10,000 MSM who often socialised in traditional gay venues in the metropolitan area, which accounted for 1% of the urban adult male population (Zhang D, personal communication). Another study in Hangzhou, eastern China, found that the emerging rate of homosexuality among the male adult population was 0.58% and the inferred prevalence rate was between 1% and 2% [78]. It is noteworthy that these studies were conducted in urban areas of China. The ease of seeking sexual partners in metropolitan areas may attract more MSM living in the countryside to move to cities, which may result in a higher density of MSM in urban areas. For example, a MSM sample recruited in Beijing found that 65% did not have a Beijing residence card [78].

No matter what the prevalence of male-male sexual behavior among the Chinese male population, there is no doubt that the absolute size of this population is large given China’s huge population of 1.3 billion. There is also cultural evidence and anecdotal reports from across China which may possibly contribute to a high prevalence of male-male sexual behavior, including the single child policy (Family planning), child sex selection, delayed marriage, declining female-male ratios, over-crowded living conditions, rural-urban migration, high levels of poverty, low levels of education, and others [79].

1.3.2 MSM with high-risk behaviors and low HIV prevalence rates

Studies in China have shown that MSM are vulnerable to HIV infection in view of their high levels of unprotected anal intercourse and high numbers of sexual partners [43, 78, 80-82]. The sexual network among Chinese MSM is complicated. One male can sell sex to gay men and also buy sex from other male or female sex workers. He could have a
long-term relationship with a man and at the same time have sex with casual partners or strangers. Some could be married and have children, and be in a *de facto* relationship with a gay man at the same time [83, 84]. They may form a special gay community and socialize within this circle. Living a double life allows MSM to pursue sexual freedom within the gay society without worrying about moral criticisms as long as they are not discovered by the general population [13].

Unprotected anal intercourse (UAI), which is more effective for HIV transmission and acquisition than heterosexual vaginal intercourse, is common among Chinese MSM. The survey conducted in a northeast city of China showed that 84.5% of MSM have engaged in UAI during the past six months [43]. Consistent condom use was about 16.0% for insertive anal intercourse and even lower for commercial anal sex (14.0%) [85]. A national survey of MSM in six cities showed similar results indicating that over 20% never used a condom during anal intercourse [83]. A recent study showed condom use consistency was less than 33% among 1,389 MSM [43]. Several other studies conducted in Beijing and Shanghai showed similar low condom use among MSM ranging from 40% to 80% [79, 83].

Having multiple sexual partners is another risk factor for HIV/AIDS transmission. The ease of finding a new partner without the fetters of a marital relationship allows MSM change sexual partners frequently. The average numbers of male sexual partners during the past six months among MSM in Shenyang and Chengdu were 20 and 7.5 respectively [86]. The sample from Beijing found over 30% of MSM had more than six partners in the previous six months [87]. A recent study among MSM in six cities showed an average number of male partners of 5.7 during the past six months.
Having sex with both men and women increases the possibility of transmitting HIV from MSM to females [88]. Main factors increase this likelihood in China including: 1) gay men often being forced to get married because of the long-standing tradition that they should have a child with their families’ surname; 2) some heterosexual boys (MB: money boy) sell sex to gay men and may also buy sex from female sex workers. This sexual network may enhance HIV spreading between two risk groups: MSM and FSWs. Male sex workers in China include both heterosexual and homosexual men. With the economic and social changes in modern Chinese society, male sex workers are changing from working independently in a park to being organized by working in entertainment establishments; 3) bisexual men account for a significant proportion of MSM in China. The survey in Harbin suggested that 34.0% of MSM identified themselves as bisexual [89], which was similar to the Beijing study (33%) [43].

Available data suggest that high-risk sexual behaviors/risk factors make Chinese MSM vulnerable to HIV/AIDS, as indicated above. However, according to current surveys in China, the prevalence rate of HIV/AIDS among MSM remains low. Repeated surveys in Harbin found that the HIV prevalence was lower than 1.5%. The 2003 national survey among MSM in six cities showed the average prevalence was only 0.6% (Gaungzhou-1.7%, Shenyang-1.2%, no infection found in another four cities) [86]. A relatively higher prevalence was found in Beijing: of 481 MSM, fifteen were tested to be HIV-1 positive (3.1%) [43]. Another survey in Shenzhen showed 5.2% of 116 male sex workers who ever tested for HIV reported receiving a positive HIV result [90]. The disease notification system from the Chinese CDC also indicates the prevalence among MSM in China is not high, although there are some limitations using reported-cases to
reflect the HIV/AIDS infection. The notified HIV/AIDS cases who were MSM accounted for approximately 0.2% of the total notified cases continually from 2000 to 2004 [83]. However, a recent study in 2007 observed an extremely high prevalence among MSM in Chongqing with a rate of 16.9% among over 400 participants (Global Fund China Program, 2007). Another recent published study shows an increasing rate of HIV infection among MSM in Beijing, from 0.4% in 2004 to 5.8% in 2006 [43]. Close monitoring of HIV prevalence in MSM will be needed. In 2008, a national campaign, dedicated to exploring risk behaviors and HIV prevalence among the Chinese MSM population at a national level, will be launched in 61 cities. This campaign will provide more data for understanding the HIV/AIDS epidemic among MSM in China.

1.3.3 Behavioral surveillance among MSM in China

HIV/AIDS sentinel surveillance and behavioral surveillance are two important approaches to monitor HIV prevalence and risk behaviors. The basic design for both approaches is a serial, cross-sectional survey measuring the key indicators in a reproducible population at risk for HIV [86]. However, sentinel surveillance mainly aims at tracking changes in HIV prevalence [91]. Behavioral surveillance, on the other hand, aims at tracking changes in risk behaviors and other pertinent factors, which is particularly useful in the early stage of a HIV epidemic [20]. Sentinel surveillance among risk groups have been conducted in China since 1995. The sub-population of MSM, however, was not introduced to this system until 2001. There is only one sentinel site among MSM in a northern city of China and this site has not functioned well since only a small number of participants could be recruited each round [20]. Since 2004, “comprehensive HIV/AIDS surveillance” among MSM has been started in six Chinese
cities. It is called “comprehensive surveillance” in that it collects risk behavioral data together with serological information (HIV and Syphilis infection), which makes it different from behavioral surveillance. However, comprehensive surveillance among MSM faces the same problems as sentinel surveillance. Although homosexuality is no longer illegal and has not been classified as a mental disorder in China since 2001 [92], the unwillingness to talk about sexual behaviors openly together with stigmatization and discrimination experienced by MSM due to the traditional eastern culture, make it very difficult for health professionals to reach this population. Moreover, laboratory costs, logistical complexities and acceptability to participants of sample taking often preclude HIV/STI testing in the field [20]. The validity of self reported data about sex and other illegal activities is another challenge. Behaviors related to HIV transmission among MSM in China, such as UAI, commercial sex or drug taking, are usually stigmatized [55]. Furthermore, the prohibitive costs and time consumed for surveys in traditional gay venues make it difficult to expand the surveillance to a larger geographic area.

As discussed before, with the development of new communication technologies, a new meeting place—the Internet—provides a virtual channel for MSM to seek sexual partners. The anonymity and complete privacy characterized by the Internet allows sex seeking without discrimination and stigmatization associated with a homosexual orientation [3, 89]. In addition, the anonymous and electronic nature of the Internet is useful in eliciting sensitive information, and also offers practical capabilities in conducting online surveys compared with conventional survey methods (e.g., the telephone, mail, and face-to-face interviewing). The Internet has opened up new vistas in the HIV/AIDS behavioral surveillance among MSM. The number of people accessing
the Internet in China has been increasing rapidly in recent years [93]. However, as behavioral surveillance requires consecutive behavioral surveys and stable sampling and study designs, the fluid nature of Internet MSM users may generate study design issues.

1.4 INTERNET, AN EMERGING RISK ENVIRONMENT FOR HIV TRANSMISSION

1.4.1 MSM, avid users of the Internet for sexual purposes

The Internet offers unlimited access to potential respondents for researchers who want to conduct web-based research [90]. With up to 972 million individuals worldwide accessing the Internet daily—15.2% of the world population—it has become an important part of daily life in many countries: in North America 68.2% access the Internet regularly, in Australia and Europe the rate is 52.9% and 35.5% respectively [76].

MSM are avid users of the Internet for sexual purposes because of its perceived anonymity, the availability of partners and less discrimination and stigmatization of homosexuality in an online setting [3, 94]. A survey in London gyms showed that around one-third of 601 MSM with access to the Internet had sought sexual partners via the Internet in 2002, three years later this figure had increased to more than 50% [16]. Furthermore, half of them indicated that they preferred to meet partners through the Internet rather than in bars or other offline venues [44]. Seeking sex has become an important reason for using the Internet for MSM. An US study of clients attending STD clinics found that Internet sex seekers were more likely to be men and homosexual [45]. Another large study in North America (4,507 Internet users) found that those who had sought sexual partners through the Internet were more likely to be male and have same
or both sex partners [53].

In China, there were more than 250 websites dedicated to gays, lesbians and bisexual people (gay websites) in 2001 [95]. By the end of 2004, the number of people accessing broadband connections in China increased to 94 million, which represents an increase of 18.2%, or 14.5 million new users compared with 2003 [95]. A Baidu search (www.baidu.com, a popular and powerful Chinese search engine) on October 2, 2007, using the key words “Gay online dating websites” (in Chinese), produced 5,900 results demonstrating the popularity of meeting potential partners online. Several recent published studies show that seeking partners through the Internet has become one of the most important ways for Chinese MSM to look for sexual partners [27, 28, 44]. The safe and anonymous nature of the Internet may attract more Chinese MSM to seek sex through that medium rather than in traditional gay venues, as homosexuals are still under huge political and cultural pressure from society and families in China [31, 96].

1.4.2 Patterns of gay websites use

With the development of the Internet, mainstream Internet providers are providing more friendly services catering to MSM for their dating and sexual purposes: searching information sources, sending electronic mail, exchanging images, video and voice messages with other users anywhere in the world, and social networking (My space and Face book) [53]. Chat rooms, profiles and bulletin boards are three popular ways for MSM to look for sexual partners. A study conducted in the USA (n = 1,176) showed that among MSM using the Internet, 90.7% preferred to seek sexual partners through chatting, whereas 64.7% preferred to browse profiles and 31.2% used bulletin boards...
Chapter one: Literature review

[97]. Gay.com (with over 1.8 million registered members) and American On Line are the most commonly accessed websites for young American gay men [40]. Gay.com, as an international website, was also very popular among Australian [98] and British gay men [89]. Although some gay oriented websites may charge a fee for full access, most of them are free.

Chat rooms, which are provided by almost all major gay websites, are the most popular services on the Internet for MSM. Chat rooms are usually organised by geographic location and sexual interest, therefore people can find other chatters located nearby or with similar sexual interests. By choosing a username or a nickname that identifies them to others, chat-room users can sign in the gay website and choose to talk to anyone they are interested in. When talking to a chatter, they can terminate the interaction at any time without worrying about any negative consequences, which may be a problem in a face-to-face encounter [87]. After identifying a potential partner online, chatters usually employ a wide range of preparatory and evaluative activities before meeting that person face to face [17].

Similar to a common online dating system, creating a profile on the Internet is another way that allows people to search for profiles that match their interests. The individual’s demographic characteristics, relationship status and sexual interests are documented in their profiles [23]. Usually these profiles include photos of users, which are helpful to elicit responses from other users. If a user finds a person he is interested in, an email can be sent, pictures exchanged and finally there can be a meeting in person. Bulletin boards or personal advertisement sections are also helpful for people to develop relationships [30, 99]. The advantages of posting an advertisement on the Internet are that it involves
no charges and can elicit many responses. The ability to conduct searches of online
member profiles simplifies the process of identifying and interacting with potential
partners, and allows men to identify and eventually meet with a large number of sexual
partners [99].

There are other services provided by gay websites that are important for gay people.
Timely news usually appears on the homepage of gay websites, which covers a variety
of information related to the gay community, such as changes of policy to
homosexuality or gay parades or festivals ongoing in a country. In the forum, people can
post essays related to homosexuality or write their own stories. Other users can make
comments on these posts, which are helpful for people to look for users sharing opinions
and interests. Health forums usually cover a wide range of topics for gay men to discuss,
such as HIV/AIDS, or “coming out” issues, which may provide an important venue for
health education.

1.4.3 How risky is the Internet for HIV transmission among MSM?

With more and more MSM seeking sexual partners through the Internet, it has been
characterised as a “new emerging risk environment for HIV/AIDS” for MSM [10, 44].
Studies in developed countries suggest that MSM who seek sex through the Internet are
at a higher risk for STD/HIV than those who do not, although the elevated risk
associated with sex seeking on the Internet is measured by a variety of indicators
depending on different research designs and methods. Internet sex seekers are more
likely to have a STD history [10, 28], practice unprotected anal intercourse [10, 96, 100]
and have a high number of sexual partners [101] than those who are not.
A survey which recruited 743 gay men from London gyms showed that Internet sex seekers were more likely to report having had STDs before, and HIV-negative Internet sex seekers were more likely to report UAI with non-concordant partners in the previous three months (23.1% vs. 11.8%) [31]. Another survey which investigated 609 men in a gay pride festival in the USA, described the extra risk of seeking sex through the Internet by indicating that: men seeking partners over the Internet had sex with more male partners in the previous six months (M = 8.4) compared with men not so seeking (M = 3.1), and meeting a sexual partner through the Internet was significantly associated with having unprotected receptive and insertive anal intercourse in the previous six months [33].

However, neither of these studies distinguished between sexual partners who were met through the Internet and those from traditional gay venues. Was the excess risk with increased sexual partners associated with the use of the Internet to identify partners [102]? A national online study among MSM conducted in the USA, which aimed to examine the relationship of substance use with high-risk sex, found that seeking sexual partners both online and offline had an association with UAI (OR, 1.4), however no associations were observed between UAI and seeking partners only online or only offline [31, 103]. Another USA study with a small sample size (n = 164) identified no differences in some critical behaviors (unprotected anal sex, number of partners or condom use) between MSM who sought sex through the Internet and who did not [33]. The authors implied that the elevated risk for Internet sex seeking were due to those using the Internet to seek sex were more likely to have fist and group sex, use drugs during sex, and particularly were more likely to report meeting partners in public
bathhouses (PR = 3.2, p < 0.001), which suggests that online sex seekers might originally be those who are likely to be at the higher end of a spectrum of risk behavior [44].

A study used the clients of a public HIV testing clinic as a target population to examine whether use of the Internet to solicit sex partners was a potential risk factor for STD/HIV [44]. Among 856 clients, Internet sex seekers were more likely to be homosexual, to have a STI and more likely to have sexual contact with a person with HIV than those who did not. Although the authors concluded that MSM were more likely to seek sex on the Internet, they could not determine whether extra sexual risk occurred with partners whom MSM actually met through the Internet [44]. Another study, conducted in the USA to examine the risk behaviors for STI/HIV among young people (aged 18-24) having sex with Internet partners (SIPs) and young people with no Internet-identified partners (NIPs), indicated that people with high-risk sexual behaviors might selectively seek sex on the Internet [104]. Of 4,507 Internet users, young SIPs had an earlier onset of sexual intercourse and were more likely to report having had an STD than NIPs. However, young SIPs also had more lifetime and 12-month non-internet partners than young NIPs. This indicates that the extra risk for young people who sought sex through the Internet than those who did not is not only from having sex with Internet partners but also from having offline partners.

Does the excess risk for STI/HIV faced by Internet sex seekers necessarily come from the sexual partners met through the Internet? Or does the association simply reflect that those with high-risk sexual behaviors selectively use the Internet to seek partners [10]? Liau et al published a Meta analysis examining the association between seeking sex on
the Internet and sexual risk behaviours among MSM [103], and the results indicates that UAI with male sex partners was more likely among MSM who sought partners online than MSM who did not (odds ratio, 1.68; 95% CI, 1.18-2.40; k = 11). However, Liau et al also commented on why the association has emerged between seeking sex on the Internet and high risk sexual behaviour. It could be a result of self selection (risky men gravitate to the Internet) or “amplification” whereby the Internet it self creates and sustains sexual networks which amplify risk [101]. Although current studies are not able to provide solid evidence to clarify the causal relationship between using the Internet and higher risk sexual behavior, they do indicate that the Internet at least has become a new risk venue for MSM.

Behavioral data can be collected in many ways depending on the nature of the health event under consideration. Since it is clear that the Internet has become a risk venue for the MSM population, surveillance should be put where the risk is. Web-based behavioral surveillance could help us to collect more specific information on the incidence and risk context of disease transmission that is linked to the Internet. It not only can help to explore the changes in risk behaviors, but also help to determine who is most at risk of contracting or passing on HIV infection, and what role the Internet is playing and how risky the Internet is in HIV transmission, which will provide evidence for further possible online health promotion.

1.5 INTERNET-BASED BEHAVIORAL SURVEYS: ADVANTAGES AND CHALLENGES

1.5.1 Effective recruitment approaches
The Internet provides an effective avenue to recruit study subjects. Several methods have been proved to be more efficient for recruitment than traditional epidemiological investigation methods. Posting banners or pop-ups on gay websites with links to the study website is a very common online recruitment tactic [31, 96, 102, 105]. A US online study recruited 628 gay men within one month by establishing a link from gay websites to the data collection site [106]. A study conducted in London in 2002 recruited gay men by building a pop-up and banners in chat rooms and personal profiles on “Gaydar” and “gay.com”, two of the UK’s most popular gay websites: 1,250 respondents completed the questionnaires within four weeks [106]. Using the same method, other investigators have also effectively recruited gay men of particular racial or minority groups [107].

Sending an email to the registered members of gay websites is another efficient way to recruit respondents [99, 105]. An invitation email can be distributed to registered members by webmasters. A advantage of this method is that researchers are able to calculate an estimated response rate based on responses from potential respondents, which helps to assess one element potential selection bias. However, this might raise ethical issues that will be discussed below.

Having a webpage presence and chatting with chatters can also be viewed as useful methods to recruit subjects. It is not difficult to establish a web page that explains the purpose of the survey and invites the target population to participate. However, attracting enough respondents within a designated period might be a challenge using these methods alone [33]. They are probably best pursued in conjunction with e-mail or banner recruiting [103]. In order to increase the response rate, providing a small amount
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of financial reimbursement as an incentive also may be helpful [108].

1.5.2 Practical advantages of online surveys

Compared to traditional survey methods, Internet-based surveys provide a more convenient way to collect and collate data [109]. Almost all traditional field surveys including mail, telephone, pen-and-paper or interviewer administered questionnaires will eventually be transferred into electronic data for analysis. In online surveys, however, questionnaires written in the hypertext mark-up language can be posted on the Internet with a visually friendly display. The completed questionnaires can be transferred directly to statistical software. The electronic nature of the data allows researchers to modify the questionnaire easily when mistakes are identified or to add more questions when extra information is needed [105]. It can also produce tailored questionnaires for specific respondents and automatically skip questions that respondents do not need to answer.

One of the greatest advantages of web-based surveys is that it allows respondents to answer questions anonymously and therefore maintain their privacy [108, 110]. The possibility exists of identifying Internet Protocol (IP) addresses and tracking personal information [111]. However, emphasizing the credibility of researchers and guaranteeing no IP identification during the investigation may reduce this concern. A study comparing the quality of self-administered pen-and-paper investigations with computer-assisted investigations found that there was less distortion in the computerized versions of interviews, while the quality of self-administered questionnaires was affected by the environment depending on whether interviewers or other people were present [35].
Additionally, online surveys can reduce social desirability bias caused by attempts to satisfy the interviewer’s expectations or being led by interviewers’ verbal expression.

Another important advantage of online surveys is its cost effectiveness. This is especially important for conducting HIV behavioral surveys in countries with limited resources. Compared to traditional field survey methods, online surveys reduce the cost of printing, stationery and postage [35]. There are no data entry costs and no data entry errors. In addition, online surveys do not need to arrange face-to-face interviewers thus reducing expenses for transportation and compensation. Once the study site is set up, there is almost no other extra cost related to online surveys [112].

The Internet appears to offer an ideal medium to conduct HIV/AIDS behavioral surveillance among MSM. However, given that the main function of behavioral surveillance is to track changes in key risk behaviors over time, systematic and replicable study designs are required. Several issues should be kept in mind when using the Internet to conduct behavioral surveillance among MSM.

1.5.3 Issues of sampling and study design

Given the fluid nature of the online MSM community and the sensitivity of homosexuality as an issue, it is difficult to develop a sampling frame to yield an online sample of MSM based on a randomized probability principle [113]. The convenience sampling design, the most common strategy used in web-based surveys among MSM, may limit the generalizability and interpretation of surveillance results. Usually in an online survey among MSM, advertisements are posted widely on gay websites or chat rooms to recruit potential respondents [35, 37, 112-114]. For specific gay websites, lists
of “user names” and/or email addresses of registered gay members do exist, however it may be difficult for researchers to access them because of privacy concerns. Even if a list of email addresses is obtained, it is still difficult to construct a random email address given the mixed quality of the list of emails provided by MSM Internet users [115]. The sampling issue is probably the biggest obstacle and methodological challenge to conduct web-based behavioral surveillance among MSM.

Furthermore, regardless of the methods used to recruit potential respondents, participation is always based on the willingness of potential target populations. What drives those MSM who access the invitation advertisements to participate? What is different between those who take part in the study and those who do not? To what extent does the online MSM population represent the total MSM population? To our knowledge there have been no studies which answer these questions and clearly clarify the potential selection bias associated with online samples. Offering an incentive may increase the response rate. The problem with offering a direct monetary reward or using a lottery system is that it requires participants to reveal their identities so that the reward can be delivered. An online experiment, however, indicates that incentives do influence drop outs, but not initial interest in participation and do not alter how participants answer the questions [37, 107].

It is also difficult to calculate the response fraction because of the difficulty in identifying the denominator [99]. Web servers can automatically record the number of visits, therefore it is possible to have a rough estimate of non-participants by subtracting the respondents, as well as calculating the individuals who visit the websites but do not participate. The problem with this calculation is that “hits” that a website receives are
different from individuals who visit it. It is also difficult to ascertain a subject’s motivation for “hitting” a website and determine whether he is eligible for a study.

In addition, usually it is assumed that young and well-educated people may account for the majority of Internet MSM users. They may possess more computer literacy or have more ready access to personal computers than older MSM [105]. Although the world is experiencing a rapid increase in the use of the Internet, countries without good computer infrastructure or where literacy is a problem, surveillance using web techniques are not possible.

In terms of the representativeness, online MSM samples are only samples of MSM who use the Internet. Internet-based surveys are not able to reach the whole MSM population [33]. However, sampling in surveys among the MSM population is a pervasive challenge for both online and traditional gay community surveys. Most current surveys among MSM are self-selected rather than probability samples. For example, the survey conducted in London, as a part of an annual behavioral surveillance program among MSM, distributed questionnaires in London gyms. Those MSM who saw the questionnaire and wanted to participate were expected to complete it [103]. No special sampling design was employed. Other MSM studies, which recruited participants from gay bars [108], from a gay pride festival [37] and from public health counselling and testing sites [116], have similar challenges.

Family Health International summarized sampling methods for behavioral surveillance among MSM, including multi-stage cluster sampling, time location sampling, the ‘take-all’ approach and ‘snowball’ sampling [116]. These sampling methods usually apply to
surveys among MSM in traditional gay venues such as gay bars, public bath houses, parks or public toilets where gay men gather. The first two methods are less prone to bias and permit the application of statistical theory to estimate the sampling error from the survey data themselves [117]. However, to use these methods one needs to develop a detailed sampling frame of venues where gay men tend to gather, which takes time and resources and is rarely satisfiable [81]. In addition, community MSM samples are restricted to the subgroup of MSM who frequent traditional gay venues. This group may be less representative of the (whole) MSM population than an online sample. Furthermore it is difficult to know how frequently gay men visit such venues. The more frequently they visit such venues, the more likely they are to be sampled. The other two methods, which are similar to the convenience sampling design, are not based on a probability principle. They are generally easier and less expensive to use, but selection bias may still be an issue from the subjectivity that often enters into the sample selection process. In addition, the replicability of the sampling process is still a challenge [35]. The Eastern Connecticut Health Outreach project developed a new approach of chain-referral sampling termed “Respondent-Driven Sampling” for surveys among “hidden populations” [44]. This sampling method has been used to collect behavioral data among hard-to-reach populations [18, 31, 104, 109]. One of key features of this method, which makes it distinct from the traditional snowballing, is to rely on a dual incentive approach—an incentive for participation plus a reward for recruiting a certain number of others into the study—to reduce the selection bias towards the initial subjects [18, 20]. This feature makes it less feasible in developing countries because of the expense involved. In addition, this method may take a long time to reach the target sample size.
Several studies conducted in developed countries have explored differences between online MSM samples and samples recruited in traditional gay venues based on convenience sampling designs [18, 20]. The studies summarized in Table 1.1 showed both differences and similarities in demographics and sexual behaviors between the two types of MSM samples. There is consistent evidence that individuals from online samples are more likely to have a lower education level and to be bisexual. However, no clear conclusions in terms of the differences in risk behaviors between the samples can be made because of different study designs and indicators for HIV risk. A challenge with these comparisons is that there are differences between the two samples other than the data collection method. None of the studies have used probability-sampling methods and the bias associated with self-selection is not clear. The impact of survey modes on collected data is not clear.

A newly published paper compared an Internet sample with a national probability sample of MSM in Britain [18]. This study suggests that the online sample is more likely to have high risk sexual behaviors than the national sample, and therefore online convenience samples are likely to overestimate levels of sexual risk behaviors in the wider MSM population. However, given differences in cultural, religious and economic situation in different countries, it is difficult to draw a clear conclusion as to the differences between online and community MSM samples, especially for China. These studies, however, potentially do indicate that online surveys can produce similar quality data to surveys conducted in traditional ways, and the Internet may serve as an expedient and reliable approach to increasing the understanding of risk among MSM [20].
Table 1.1 Differences in demographic characteristics and sexual behaviors between online and community MSM samples

<table>
<thead>
<tr>
<th>Authors</th>
<th>Country</th>
<th>Sampling methods</th>
<th>Key differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ross MW et al. (2000)</td>
<td>Sweden</td>
<td>Questionnaires were launched on the homepage of the most popular Swedish gay website (n = 678)</td>
<td>Younger, and more likely to be bisexual and less educated, and to live in small towns/cities and live with parents or a girlfriend. No significant difference in key risk sexual behaviors except the online sample reported more condom use for anal sex with steady partners.</td>
</tr>
<tr>
<td>Rhodes SD et al. (2002)</td>
<td>Birmingham, USA</td>
<td>Establishing links with gay websites (n = 383)</td>
<td>Older, and more likely to be bisexual and have a lower education level. More likely to have a STD infection history and to be self-reported HIV positive; Less likely to report having engaged in anal intercourse in the past 12 months.</td>
</tr>
<tr>
<td>Elford J et al. (2004)</td>
<td>London, UK</td>
<td>Posting banners in two international gay websites: gay.com and gaydar (n = 1,218)</td>
<td>Younger, and more likely to be bisexual and less educated, and to be in a relationship with men. Regardless of HIV status, online samples are more likely to have higher risk sexual behaviors, such as engaging in UAI with an unknown HIV sero-status partner and seeking sex on the Internet.</td>
</tr>
<tr>
<td>Evans AR et al (2006)</td>
<td>London, UK</td>
<td>Participants were recruited through two popular gay websites in Britain (n = 2,065)</td>
<td>Younger, and more likely to be students and less likely to live in London or report good health. More likely to report a sexually transmitted infection in the past year, anal intercourse and UAI in the past three months.</td>
</tr>
</tbody>
</table>
The sampling issue is generic to all surveys among MSM and it does not pose a particular problem on the Internet. In fact, due to the ease and the anonymity of answering, this selection bias may be minimised in an online setting. Increasing the sample size and using multiple recruitment methods to maximize the diversity of potential respondents, which are highly possible in an online survey, can significantly reduce selection bias[20]. Furthermore, selection bias might be decreased as more people access the Internet in the future. In addition, online surveys may potentially reach many MSM who do not frequent traditional gay venues and cannot be recruited from community-based surveys [118]. Monitoring key demographic characteristics of an online MSM population may help evaluate any potential selection bias. Changes in the demographic composition of online MSM samples over time may highlight a need for statistical adjustment, or differences between participants and non-participants may point to the potential direction of any bias [119].

In addition, the key purpose of HIV/AIDS behavioral surveillance, an important part of an HIV/AIDS comprehensive surveillance system, is to track the changes in risk behaviors that put MSM at risk for HIV. The surveillance methods are defined more by their practicability, uniformity, and rapidity, rather than completeness and accuracy. Undertaking surveillance that entails time-consuming and costly sampling frame development and related preparatory activities is inappropriate if public health resources are scarce and limited. In terms of routine surveillance, the more complicated the process is, the less precise the results, especially in developing countries. In certain circumstances it is not necessary to create representative samples of the whole target MSM population in the behavioral surveillance. As long as the direction and magnitude
of biases are known and constant over time, samples of sub-groups of MSM still provide valuable information about the trend of risk behaviors.

1.5.4 Anonymity and privacy

As discussed above, one of the most important reasons for gay men to seek sex on the Internet is its anonymous and safe nature. However, when sensitive sexual behaviors are evaluated, especially related to stigmatized or illegal behaviors, could the respondents still believe answering the questionnaire is anonymous and confidential since it is possible to identify participants’ Internet Protocol (IP) address? Encryption has been used to protect the transmission of confidential information in many fields, however, it cannot protect participants’ IP address [120]. Informing the potential respondents of 100% of anonymity and confidentiality and no IP address determination is always essential for such investigation [89]. However the potential influence on the participation rate and the quality of data is still unclear. Further studies are necessary in different population settings.

Sending emails to a target population is a very popular method to recruit potential participants [118, 121]. However, this method sometimes can cause serious ethical problems [118]. Mehta and Sivadas reported that they had to stop their research after sending emails to recruit participants, because of complaints about unwanted emails [122]. These unsolicited emails can potentially threaten the privacy of receiver. First, many people read emails at work, where personal emails are not necessarily considered to be private. Employers and web-masters may reserve the right to monitor their employees’ emails. Second, some people may check their emails at home [109], where
other family members may also use this computer. Such emails may potentially cause some misunderstanding and jeopardise the receiver’s privacy.

1.6 Online health promotion, a possible way for HIV/AIDS prevention?

Since looking for sexual partners has become one of the most important purposes for MSM to use gay websites [115, 123], “is it possible to conduct health promotion and behavior interventions among MSM while they are in the act of seeking sexual partners online” [109]? A study conducted in London suggests that MSM show favorable attitudes to online health education. Of all the respondents, 75% thought that Internet sites should permit health professionals into chat-rooms, 84% wanted to talk with them in the chat-room, and 78% would click on a banner to look for sexual health information [124]. A US study explored the online users’ attitudes to STI prevention and education. Most people (61%) would visit a website to search for STI information, and some would read an email (45%) or chat with health professionals (30%) [113]. These positive attitudes, together with other advantages of online intervention, e.g. saving time and resources and easy of management, limitless potential respondents and protection of privacy, make the Internet a promising place for health promotion and education.

However, the effect of Internet health promotion or interventions on behavior change among MSM has been challenged. A study to evaluate the effect of specific and tailored online information for HIV positives found their healthy behaviors were only maintained for two months after the program was terminated [3]. The quality of online information may be another issue that affects online education. With so many websites providing health information around the world, it is difficult for gay men to determine whether the
information is knowledgeable and can be trusted. The US study indicated that concerns about the quality of online information was one of the most common reasons for people not using gay websites to access STI/HIV information [113]. In addition, the coverage of online interventions should also be considered, as not everybody has the opportunity to access the Internet.

1.7 CONCLUSION

Web-based surveys can be viewed as an efficient and feasible approach for such surveillance, especially in countries where the HIV/AIDS epidemic is concentrated in high-risk populations and to conduct such behavioral surveillance in traditional gay venues is difficult. Sampling and study design should be carefully considered when using the Internet to conduct HIV/AIDS behavioral surveillance among MSM. As technology becomes more advanced, many issues related to online surveillance may be solved in the future. The Internet, as a new venue for sexual networking of MSM, presents a compelling channel to develop new methods in HIV/AIDS risk behavioral surveillance among MSM and health intervention as well.
CHAPTER TWO

COMMUNITY-BASED HIV/AIDS SURVEILLANCE

—Changes in HIV prevalence and sexual behaviors among men who have sex with men in a northern Chinese city: 2002-2006
2.1 BACKGROUND

China is facing an emerging HIV epidemic among men who have sex with men (MSM). This has been widely reported in government documents and research papers [110, 111, 115, 125]. The estimated results in 2005 indicated that there were approximately 650,000 people living with HIV/AIDS in China, of whom 7.3% were classified into the MSM risk category [125]. Although the majority of HIV/AIDS cases in China are associated with injecting drug use [10, 85], the HIV prevalence among MSM in some metropolitan areas is reaching levels of concern. For example, the HIV prevalence among MSM is 3.1% in Beijing [126], 1.7% in Guangdong (Southern China), and 1.2% in Shenyang (northern China) [127]. The high prevalence of risk factors for HIV transmission such as unprotected anal intercourse, multiple sexual partners and deficiency of HIV prevention knowledge, put Chinese MSM at high risk for HIV infection [42, 128, 129]. Although overall national HIV infection rates among MSM are relatively low, even a small increase in the infection rate can translate into a large number of people infected with HIV given the huge size of the MSM population in China (estimated 20 million) [53].

Most current surveillance efforts among MSM in China have focused on HIV prevalence and HIV/AIDS case finding. HIV prevalence rates or case reporting data, may not serve as a good indicator of increases in new infections or as a measure of success of intervention programs designed to reduce new infections [54], especially when HIV prevalence is relatively low. One reason is that data on notified HIV/AIDS cases are affected by HIV prevention strategies. For example, a national campaign
against AIDS in China may encourage more people to get tested, and then additional HIV/AIDS cases will be identified and notified. In addition, the low quality of the HIV/AIDS case reporting system including repeated and/or incomplete reporting may limit its ability to track real changes in HIV infection over time \cite{17, 130}. Therefore, tracking changes in risk behaviors and other pertinent factors that place the MSM population at risk is important, especially at the early stage of the HIV/AIDS epidemic, because it can highlight where, in which group and the extent to which infection is likely to spread \cite{50, 52}.

Substantial changes in gay men’s sexual behaviors have been observed internationally since the emergence of the HIV epidemic \cite{43, 54, 91}. Recent studies have reported a resurgence of the HIV epidemic among MSM \cite{42} and an increase in high risk sexual behaviors and HIV/STI infections \cite{17, 22, 39, 79, 124}. The HIV epidemic among MSM in China has been relatively neglected, and only in recent years relevant education and intervention programs have been introduced as a part of national HIV prevention strategies \cite{124, 131}. In 2004, a comprehensive surveillance system which combines behavioral and HIV serologic surveillance among MSM, was set up in six Chinese cities by the Chinese Central Government (active surveillance). However, these surveillance sites are not functioning very well because of low quality of collected data, relevant small sample sizes, and limitations in sampling methods as well as inadequate financial support. Another challenge to current surveillance among MSM in China is that it collects intravenous blood samples for HIV testing. A fear of needles and difficulty of managing blood collection in the field reduce its acceptance for MSM. The surveillance results provide limited information on the HIV epidemic in China and it is difficult to
evaluate the effect of current intervention programs in the MSM population based on these data. Therefore, it is necessary to conduct surveillance to examine trends in both risk behaviors and HIV prevalence among MSM in China using methods that will produce more useful data.

The aim of this project was to examine whether there were any changes in risk behaviors and HIV prevalence among the MSM population in north China over the period of 2002 to 2006, following current HIV prevention strategies introduced in 2002, and to provide evidence for developing, implementing and evaluating effective HIV prevention programs in China. This study, including focus group discussions and community based surveys, received approval from the University of Adelaide Human Research Ethics Committee and the Research Ethics Committee in the China National Centre for AIDS/STD Control and Prevention.

This project addressed research question one:

1. *Explore trends in risk behaviors and HIV prevalence rate among MSM in Harbin from 2002 to 2006 and explain changes over time.*

### 2.2 METHODS

The study described in this chapter included three cross sectional surveys among MSM in Harbin, China, conducted in 2002, 2004 and 2006. The first two surveys were conducted by myself when I was at in the China National Center for AIDS/STD Control and Prevention (NCAIDS). The 2006 survey was also completed by myself during my PhD candidature in the Discipline of Public Health, the University of Adelaide. The comparison of the three surveys allows me to track the trend in risk behaviors and HIV
prevalence among MSM in China. All three surveys were carried out based on the same protocol.

2.2.1 Description of the study city

This study was conducted in Harbin. In 2002, studies among the MSM population in China were rare and MSM were very difficult to reach. The city was chosen as the study site mainly because that staff from Heilongjiang Center for Disease Control and Prevention and gay volunteers in Harbin showed their high interests in this program and would like to offer help and support for the field investigation. As the capital city of Heilongjiang Province in northeast China with an urban population of 3.9 million, the MSM population in Harbin was relatively active. A hot line and a gay website supporting the gay community have been established since 2002. In addition, peer education, outreach and condom promotion programs among this group have been conducted sporadically.

The HIV/AIDS epidemic in Harbin remains at a relative low level. Since the first HIV/AIDS case was confirmed in 1993, a total of 95 HIV infections have been notified by the end of 2005, of whom 21.1% were infected through heterosexual contacts, 16.8% by using contaminated blood products, 9.5% were associated with injecting drug use, 9.5% were former paid blood donors and 6.3% were men who have sex with men. The route of infection was not identified for the remaining infected individuals.

2.2.2 Study subjects
The target population of this study was restricted to MSM who socialized in traditional gay venues. Because all participants of the three rounds of surveys were recruited in traditional gay venues, such as gay bars, public bath houses, public toilets or parks where MSM might intentionally congregate to seek sexual partners, caution should be given in interpreting the findings. This group might consist of MSM with an elevated risk for HIV infection and transmission.

To be eligible to participate in these surveys, the subject met the following criteria [16, 18].

- Male living in Harbin, China;
- 18 years old or over;
- Having or have had oral or anal intercourse with men in the past year regardless of self-identifying as homosexual, bisexual or heterosexual.

### 2.2.3 Sampling design

#### 2.2.3.1 Formula for calculating sample sizes

The sample size was calculated using a basic formula for surveys designed to measure changes in given indicators over time. The expression of the required sample size for each survey by this formula was given by [5]:

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Chapter two: Community-based HIV/AIDS surveillance

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2.2.3.2 Sample size calculation

The key objective of tracking changes in risk behaviors based on three time points was considered when calculating the sample size. For the purpose of the sample size calculation, five key factors were considered:

A: The initial or starting level of the key indicator (\(p_1\))

The proportion of unprotected anal intercourse (UAI) in the past six months among MSM was used as the key indicator to calculate the sample size. Previous surveys conducted in Harbin showed that approximately 85% of MSM reported having had UAI during the past six months (regardless of insertive or receptive anal sex) [4]. Hence, 85% was used as the initial level of the key indicator in the sample size calculation.

\[
n = D \left[ z_{1-a} \sqrt{2p(1-p)} + z_{1-\beta} \sqrt{p_1(1-p_1) + p_2(1-p_2)} \right]^2 \frac{1}{(p_2 - p_1)^2}
\]

Where:

- \(D\) = design effect
- \(p_1\) = the estimated proportion at the time of the first survey
- \(p_2\) = the target proportion at the second survey, so that \((p_2 - p_1)\) is the magnitude of change that is supposed to be detected
- \(\bar{p} = (p_1 + p_2)/2\)
- \(Z_{1-a}\) = the Z score corresponding to desired level of significance
- \(Z_{1-\beta}\) = the Z score corresponding to desired level of power

**Figure 2-0 Formula of calculating the sample size for measuring the trend**
**B: The magnitude of change that was detected reliably (p2-p1)**

A decrease of ten percentage points in the proportion of UAI in the past six months was considered to be important to be detected.

**C: The level of significance (α)**

Given that some educational and interventional efforts had been conducted and an increase in condom use was observed in this study area [132], a decrease in the proportion of UAI in the past six months should be detected and thus a value of $Z_{1-\alpha}$ for a one-tailed test with a 95% confidence (1.64) was used to calculate the community sample size.

**D: The power (β)**

Usually a minimum value of $Z_{1-\beta}$ of 80% is necessary [8]. In this study it was set at 85% in order to increase the ability to detect a meaningful change.

**E: The design effect (D)**

The formula given for sample size calculation includes a term D for the design effect. This is used in multiple-stage sampling designs to correct for the difference between the chosen design and a simple random sampling design. The magnitude of the design effect depends on the degree of homogeneity of the target population within primary sampling units (PSU) and the number of sample respondents to be taken from each PSU. Usually a default value of $D = 2$ is thought to adequately compensate for the loss of accuracy resulting from a two-stage sampling design [5]. In this study, a quota sampling design based on the size of each subgroup (described
in section 2.2.3.3: sampling) among the MSM population was used for the community survey. Because of the short period of field survey time and other practical reasons for field investigation, the design effect in the community survey was set at $D = 1.5$ which results in a 50% increase in the sample size in order to decrease the impact of potential impact or bias resulting from non-independence of observations within subgroups.

**Table 2.2 1** presents the results of the sample size calculation. In order to detect a 10% decrease over three time points of the surveys in the prevalence of UAI in the past six months among MSM living in Harbin, based on a 95% level of significance with 85% power assuming a design effect of 1.5, a minimum of 408 eligible respondents were to be recruited in each phase of the community survey.

**Table 2.2 1 Sample size calculation for the community based surveys**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Indicator</th>
<th>Design effect</th>
<th>Initial level</th>
<th>Magnitude of change</th>
<th>Level of significance</th>
<th>Power</th>
<th>Sample size of each survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detecting changes in risk behaviors overtime</td>
<td>The proportion of UAI among MSM in the past six months</td>
<td>1.5</td>
<td>0.85</td>
<td>-0.10</td>
<td>1.64</td>
<td>1.28</td>
<td>408</td>
</tr>
</tbody>
</table>

**2.2.3.3 Sampling methods**

The sampling process has two steps [31]:

- **2.2.3.3.1 Sampling method**
- **2.2.3.3.2 Sampling procedure**

In the community survey, a total of 408 eligible respondents were recruited in each phase based on the sample size calculation.
Firstly, a list of all gay venues together with information on the estimated number of visitors per day in each venue was developed based on a focus group discussion among key informants (see section 2.2.5.3 for details). Gay venues were classified into three groups. Group A included gay sauna centers and/or public bath houses; group B included gay bars, dancing clubs and Internet cafes; group C consisted of public toilets, bus stations, and parks where MSM tend to gather. As there were only approximately 20 gay venues in Harbin, all gay venues were included in the sampling process of this study.

Secondly, sampling from each of the three groups was in proportion to their estimated numbers of visitors. Within each group a convenience sampling method was used and respondents were recruited from all gay venues within the group until the sub-sample size was reached.

2.2.4 Design of questionnaires

For comparison purpose, the questionnaire used in the community survey was based on the one developed by the Family Health International [133] and the one used in a similar cross-sectional survey in Beijing [4]. The questionnaire was adapted to fit the linguistic and cultural context of China (See Appendix A). The questionnaire consists of four categories of information: social demographic characteristics, HIV/AIDS knowledge, sexual behaviors and STI/HIV history.

A: Social demographic characteristics

Respondents’ information about date of birth, occupation, province of residence, education level, marriage status and sexual orientation.
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B: HIV/AIDS knowledge

Decreasing penetrative anal intercourse and increasing condom use are promoted in most current HIV/AIDS intervention programmes among MSM. Thirteen statements related to the two strategies were included in the questionnaires of 2002 and 2004 in order to measure the extent to which knowledge had reached the MSM population. In order to better reflect knowledge and beliefs about HIV/AIDS transmission and make the results more comparable to other behavioral surveys among MSM in China, new indicators were used in 2006 to evaluate knowledge and beliefs on HIV prevention. These new internationally-accepted indicators were originally developed by the UNGASS (the United Nations General Assembly Special Session on HIV/AIDS) [132] and adapted to fit the Chinese linguistic and local context. These new indicators, however, are not able to be compared directly with the results in 2002 and 2004 surveys.

C: Risk behaviors

Risk factors associated with unprotected anal intercourse were collected, including numbers of male and female sexual partners—lifetime and in the previous six months; frequency of anal and vaginal sex in previous six months; condom use during anal (insertive and receptive) and vaginal intercourse; commercial sex (exchanging sex for money or exchanging money for sex); use of illicit drugs and associated injecting behaviors.

D: STD infection history
The STD infection history was collected to provide an estimate of STD infection rate among MSM.

### 2.2.5 Data collection

#### 2.2.5.1 Pilot study

Six gay volunteers were invited to review the questionnaire. Necessary changes have been made based on their comments and suggestions. The questionnaires completed during the pilot study were not included in the final data analysis.

The following issues were raised for volunteers’ consideration in the review of the questionnaire.

- How long did it take to complete the community and online questionnaires?
- Were the instructions clear?
- Were any questions unclear or ambiguous?
- Has every appropriate answer to the key questions been anticipated?
- Why did you refuse to answer any of these questions?
- Was the layout clear and attractive?
- Did you feel uncomfortable with any question, why?
- Were there any other comments?

#### 2.2.5.2 Selection and training of investigation personnel

In June and July, 2006, six field teams, each of which consisted of one interviewer and one recruiter, carried out the field work in the same procedures as the surveys in 2002 and 2004.
Recruiters for the survey were gay volunteers. Their responsibility was to approach potential respondents, introduce them to the interviewers and encourage them to participate in the study. Recruiters were required to be free from 5pm to 11 pm during the survey period, have completed at least high school (year 12) and have strong interpersonal and communication skills.

The six male interviewers included three health professionals and three gay volunteers. The gay volunteers were trained specifically for the interviews in bath houses because heterosexual male interviewers might be uncomfortable in these venues. These interviewers had rich experience in other HIV/AIDS intervention programs. The other three interviewers were health professionals including one Master student from the NCAIDS, one staff member from the Heilongjiang CDC and myself.

Both interviewers and recruiters had one day training following the protocol and methodology used in the survey. About 60% of the training time was allocated for role playing and practising interviewing techniques. Training covered the following:

- Basic knowledge of HIV/STI;
- The purposes and significance of the surveys;
- The standard procedure of an interview;
- Overview of questionnaire;
- Techniques for eliciting true information about sensitive topics;
- Social words or terms used by MSM for STIs and various sexual practices;
- STI/HIV counseling (Not applied to gay volunteers);
- Problem solving during the interview.
2.2.5.3 Focus group discussion

Before each round of the field investigation, a discussion with a group of key informants was conducted to identify potential gay venues and estimate the number of MSM visitors per day in each venue for the development of the sampling design.

Although the focus group discussions did not seek representative samples, the diversity of key participants and the range of experiences within gay communities were considered by recruiting key informants from different types of gay venues [63]. Key informants included: a) managers or “gatekeepers” of gay public bathhouses/sauna centers, actors or waiters in gay bars, b) gay men who visited public parks or bus stops where men cruised for same gender sex, and c) gay website users who frequently look for sexual partners through the Internet [12, 42]. Eligibility for participation in the group discussion was restricted to a) men who were Chinese, b) had had sex with men in the past year and c) who were familiar with the local gay community.

All participants for the group discussion were notified of the aim and procedure of discussion, the involved personnel, the potential consequences of the interview and the rights of participants in order to obtain informed consent. Ethics approvals were obtained from the University of Adelaide Human Research Ethics Committee and the Research Ethics Committee in the China National Centre for AIDS/STD Control and Prevention.

Group participants were asked to make a list of all the potential gay venues where MSM tended to gather, which included the name, type and address of the gay venues, and the estimated number of MSM visitors each day. Key informants were familiar with these venues.
gay venues and were able to provide estimates of the number of visitors in traditional gay venues [18, 83]. Pamphlets on HIV prevention, contacts for support groups and 50 RMB (A$ 8) were offered to the participants for their contributions.

After discussion, all venues in the list were visited by the researchers to check the accuracy of the average number of visitors in each venue as estimated by the key informants. By having casual conversations with patrons in the listed venues, gay venues that were not covered in the discussion were then updated to finalize the list. (Table 2.2 2)
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Table 2.2  Number of gay venues in Harbin by study year

<table>
<thead>
<tr>
<th>Type</th>
<th>2002</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public bath houses/sauna centers</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Gay bars, dancing clubs and internet cafes</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Public toilets, parks and bus stops</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

2.2.5.4 Field data collection

As discussed in the “sampling design” section, the traditional gay venues were classified into three groups, and the sample size was distributed across the three groups in proportion to the estimated visitor numbers in each group. Respondents were recruited from all gay venues within each group until the sub-samples sizes were reached. It was completed in two months for collection in each round. The survey procedure is described as follows.

A: Preparing for interviews

With the help of the Heilongjiang Centre for Disease Control and Prevention, discussions with the managers or owners of gay bars and public bath houses were conducted before the interviews to obtain permission to perform surveys in their venues. A separate interview room in these venues was arranged to keep conversations confidential. Compensation was offered for the interference with their business.

Generally, the field investigation started at 5pm and ended at 11pm every day. A short meeting was organised for all interviewers at 4pm to ensure they took all the
necessary supplies: official identification, informed consent forms, questionnaires, a pen, plastic cups and tubes for urine samples, male condoms, lubricants, and AIDS education brochures.

**B: Acquiring informed consent**

After introducing the interviewer to the participant, the gay volunteer left the interview room. The interviewer showed the informed consent form (ICF) and explained it to the respondents.

The Informed Consent Form provided the following information: *(Appendix B).*

- Who is conducting this research and who sponsored it?
- Who is eligible to take part in this study?
- What are the participants’ rights?
- What are the purposes and procedures of this study?
- What are the risks and benefits from this study?
- What measures are going to be taken to protect the respondents’ privacy?

If a respondent agreed to take part in this study, he was asked to sign the ICF. It is the respondent’s option to sign his real name or not for the consideration of his privacy. It is acceptable if the respondent only signed “AGREE”. For those respondents who agreed to participate but did not want to sign the ICF, the interviewers were required to sign their own names on the ICF to indicate that a verbal consent was granted. If the respondents refused to participate, they were thanked for talking to the interviewer.
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The majority of participants in all three rounds surveys provided verbal consent. Few people signed the Informed Consent Form.

**C: Interviewing participants**

Interviewers read each question exactly as it was in the questionnaire and recorded answers. Clarification was sought with any unclear answers. Interviewers were required not to guess the answer according to social expectations. A small number of participants requested to complete the questionnaire by themselves. Interviewers were then required to check the consistency and completeness of the completed questionnaire and ask the respondent any questions that might have been misunderstood.

Because different volunteers used different methods to recruit potential participants, some of them usually recruited MSM whom they knew, and some of them asked other MSM to help them to recruit. We believe that a systematic count of refusals would not make great contributions to the understanding to the representativeness of samples. Therefore no systematic count was kept, and only rough estimates of refusals were given in the thesis.

**D: Collecting urine samples**

After completing the questionnaire, respondents were asked to provide a urine sample to test their HIV status. Plastic cups were provided and urine samples were stored in plastic tubes. Each sample had a unique 4-digit identification number that matched that on the corresponding questionnaire.


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**E: Compensation**

No financial compensation was provided for participation. A pack of condoms (12 items) and a bottle of lubricant (KY, 40ml), were provided to participants. Interviewers were also required to provide pre-testing health education counselling to respondents. Respondents who wanted to know their HIV test results were provided with a card with the ID number of their questionnaire and a confidential code. After four weeks, test results could be collected at a specified Centre for Disease Control and Prevention by showing the card. Respondents were advised to keep the card confidential in case of disclosure of their HIV status.

**F: Team meeting**

A daily meeting was held every day for problem solving. Completed questionnaires and collected urine samples were collated and checked for consistency and completeness.

**2.2.6 Laboratory test**

The urine samples were sealed in plastic tubes and transported at 4 °C to the Heilongjiang HIV/AIDS Confirmatory Laboratory in Harbin. The collection of a urine specimen was more convenient and client-friendly than taking a traditional blood sample by venipuncture, especially for MSM.

HIV-1 Urine Enzyme-Linked Immunosorbent Assay (ELISA, Calypte Biomedical Corporation, Berkeley, USA), which has been approved by the Chinese Food and Drug
Administration, was used to test for HIV-1 antibodies. No other test methods were used as other urine test methods were not available in China. The urine tests were analyzed in the HIV/AIDS confirmatory laboratory in Heilongjiang Province. All laboratory procedures were performed according to the “China National Protocol for HIV Testing”.

2.2.7 Data analysis

The analysis of the surveys in this chapter focused on the indicators which define aspects of behavior that are important to the spread of HIV and behavior that is crucial to HIV prevention/intervention programs. Frequencies and medians for categorical and continuous variables were calculated by year of survey, and statistical significance was tested using chi-square tests or Kruskal-Wallis tests. To test for trends over time in categorical variables, chi-square tests for linear trend were used considering the year of survey as an ordered categorical variable.

To explore changes in key risk behaviors, number of male partners and consistency of condom use was further analyzed in a logistic model. In this model, the independent variable was year of survey, which was entered as a dummy variable. The dependent variables were the number of male partners and consistency of condom use. Age and sexual orientation were controlled as confounders in the analysis of the number of male sexual partners, and age and living with a male partner were adjusted in the analysis of consistency of condom use. Other potential confounders that have been demonstrated in other studies [83] including age at first sex, exchanging sex for money, exchanging money for sex and STD history were also adjusted in these models. The adjusted odds ratios derived from these models measured the change from one year to the next in the
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likelihood of reporting UAI, having more than six partners in the past six months and
condom use during anal sex in the past six months (never/always). UAI was defined as
the number of respondents who did not use a condom every time they had anal sex with
a male partner in the past six months divided by the total number of all participants
[134]. The reverse of this indicator referred to those who had no anal sex or always used
a condom during anal intercourse in the past six months [135].

Stata 9.0 was used for the above analysis.

2.2.8 Ethical issues

There may have been psychological risk to participants due to the sensitive nature of the
questions in the questionnaire, such as sexual behaviors, drug use or sexually transmitted
disease history. Interviewers received professional training on interview techniques.
Participants were fully informed that participation was voluntary and they had the right
to reject any questions or to withdraw from the investigation at any time. They were also
informed that the surveys were anonymous and no identifying information was collected.
Only aggregated and unidentified data will be published in scientific journals.

HIV testing might cause anxiety and discomfort for participants. They might feel
anxious, sad or even desperate once they knew their HIV positive status. They might
also worry about the disclosure of their HIV status. Participants were assured that HIV
testing was anonymous and data collection was strictly confidential. All participants
who had an HIV test could receive pre-test counseling, health education information,
and appropriate referrals to health professionals. For those who wanted to know the HIV
testing results, post-test counseling was provided by health professionals at the specified
Centers for Disease Control and Prevention. Participants who were HIV positive were referred to relevant CDCs for appropriate support and HIV case management services.

No personal identification information was collected. All entered data were stored in an appropriate password protected computer database, on a password protected network within the password protected and fire-walled computing environment of the Discipline of Public Health, the University of Adelaide.

2.3 RESULTS

Overall, a total of 1,337 men participated in this study over the three rounds of surveys: 232, 421 and 684 participants were interviewed in 2002, 2004 and 2006 respectively. Most participants provided completed questionnaires: 215, 397 and 648 in each round. There were 154 urine samples collected in 2002, 320 in 2004 and 674 in 2006 (26 respondents in 2006 agreed to provide samples for HIV tests but provided incomplete questionnaires). No systematic count was kept of refusals, but our impression was that about 70% of potential respondents in 2002 refused to be interviewed when peer-recruiters invited them to participate in the study and that this refusal rate decreased to about 50% in both 2004 and 2006.

2.3.1 Trends in demographic characteristics

Differences in demographic characteristics were observed among MSM recruited from the different study years (Table 2.3 1).

Participants recruited in 2004 were younger than men recruited in 2002 and 2006. The median age for men in 2004 was 26 years old (range: 18-75 years), while it was 29 years
(range: 18-67 years) in 2002 and 27 years (range: 18-69 years) in 2006. Men recruited in 2004 appeared to have a lower proportion aged over forty. This could reflect the increased proportion of students who were recruited in 2004: 25.4% were full-time students, while the proportions were 12.0% in 2002 and 17.7% in 2006. After stratifying the respondents into two groups: students and non-students, there were no significant differences in age across three study years (Kruskal-Wallis test: $\chi^2 = 3.707, p = 0.1567$ for students; $\chi^2 = 1.455, p = 0.4832$ for others). \textbf{Figure 2.1} indicates that the median age of students were significantly lower than non-students.

Most of the respondents had a relatively high level of education across the three surveys. Fewer than 2% had an education of primary school or less. Men recruited in 2004 were more likely to have a tertiary education and a lower employment rate, compared with those in 2002 and 2006. This may also reflect the student involvement in the 2004 survey, since two thirds (67.0%) of students had a college education and students usually were not employed. Overall industrial laborers (17.1%) and self-employed businessmen (20.6%) were the most commonly reported occupations. Less than 1.5% reported currently serving in the military.

As shown in \textbf{Figure 2.2}, a significant trend was observed with increasing proportions of MSM identifying themselves as homosexual (Chi square test for linear trend, $\chi^2 = 30.53, p < 0.001$) and at the same time a reducing proportion of men self-identified as bisexual (Chi square test for linear trend, $\chi^2 = 21.35, p < 0.001$). Only a small proportion identified themselves as heterosexual. Consistent with this, an increasing proportion of respondents were currently living with a male partner (Chi square test for linear trend, $\chi^2 = 65.89, p < 0.001$). No significant changes were seen in the proportion of men who
lived with a female partner (Chi square test for linear trend, $\chi^2 = 0.01, p = 0.929$). After stratifying for student status, the increasing trend in living with a male partner was significant for both students and non-students (Chi square test for linear trend: $\chi^2 = 33.50, p < 0.001$ for students; $\chi^2 = 38.95, p < 0.001$ for non-students).

With regard to sexual preferences, no difference was detected in the proportion of sexual preferences between 2002 and 2004 ($\chi^2 = 7.6245, p = 0.054$). Nearly half noted both insertive and receptive anal sex, and less than 15% preferred only receptive sex. However, compared with 2002 and 2004, men recruited in 2006 were more often to prefer only receptive anal sex (28.3% vs. 14.8%).
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Figure 2.1: Age of men who have sex with men
By Year of survey and student status

Figure 2.2: Self-reported sexual orientation among MSM
By Year of survey
Table 2.3.1 Demographic characteristics by year of survey

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>2002 (n = 215)</th>
<th>2004 (n = 397)</th>
<th>2006 (n = 647)</th>
<th>P  *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20</td>
<td>13.7</td>
<td>28</td>
<td>12.0</td>
<td>47</td>
</tr>
<tr>
<td>21-30</td>
<td>39.2</td>
<td>80</td>
<td>54.1</td>
<td>212</td>
</tr>
<tr>
<td>31-40</td>
<td>34.8</td>
<td>71</td>
<td>25.0</td>
<td>98</td>
</tr>
<tr>
<td>≥41</td>
<td>12.3</td>
<td>25</td>
<td>8.9</td>
<td>35</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior high school or less</td>
<td>16.7</td>
<td>36</td>
<td>13.4</td>
<td>53</td>
</tr>
<tr>
<td>Senior high school</td>
<td>40.5</td>
<td>87</td>
<td>31.8</td>
<td>126</td>
</tr>
<tr>
<td>College</td>
<td>42.8</td>
<td>92</td>
<td>54.8</td>
<td>217</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>12.0</td>
<td>25</td>
<td>25.4</td>
<td>90</td>
</tr>
<tr>
<td>Non-student</td>
<td>88.0</td>
<td>184</td>
<td>74.6</td>
<td>264</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>66.8</td>
<td>141</td>
<td>62.5</td>
<td>245</td>
</tr>
<tr>
<td>Unemployed</td>
<td>33.2</td>
<td>70</td>
<td>37.5</td>
<td>147</td>
</tr>
<tr>
<td>Living with someone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with a male partner</td>
<td>12.2</td>
<td>26</td>
<td>29.0</td>
<td>113</td>
</tr>
<tr>
<td>Living with a female partner</td>
<td>1.87</td>
<td>4</td>
<td>1.0</td>
<td>4</td>
</tr>
<tr>
<td>Single</td>
<td>86.0</td>
<td>184</td>
<td>70.0</td>
<td>273</td>
</tr>
<tr>
<td>Self reported sexual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homosexual</td>
<td>58.2</td>
<td>124</td>
<td>74.9</td>
<td>290</td>
</tr>
<tr>
<td>Bisexual</td>
<td>34.3</td>
<td>73</td>
<td>17.8</td>
<td>69</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>3.3</td>
<td>7</td>
<td>0.8</td>
<td>3</td>
</tr>
<tr>
<td>Undecided</td>
<td>4.2</td>
<td>9</td>
<td>6.5</td>
<td>25</td>
</tr>
<tr>
<td>Sexual preferences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only insertive anal</td>
<td>31.4</td>
<td>65</td>
<td>25.7</td>
<td>89</td>
</tr>
<tr>
<td>Only receptive anal</td>
<td>10.1</td>
<td>21</td>
<td>17.6</td>
<td>61</td>
</tr>
<tr>
<td>Both</td>
<td>48.8</td>
<td>101</td>
<td>49.7</td>
<td>172</td>
</tr>
<tr>
<td>Neither</td>
<td>9.7</td>
<td>20</td>
<td>6.9</td>
<td>24</td>
</tr>
</tbody>
</table>

* Pearson Chi square test
b Chi square test for linear trend

Note: Number of respondents answering each question varied slightly because of missing values.
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2.3.2 Trends in sexual behaviors

The differences in sexual behaviors reported in the three surveys are presented in Table 2.3.2.

2.3.2.1 First sexual experience

No significant difference in the age at first sexual experience was observed over the study years (Kruskal-Wallis test: $\chi^2 = 1.406, p = 0.4950$). The reported median age was 18 years old (range: 8-44). Most first (74.8%) had sex between the ages of 17-21 years. Less than 5% had their first sexual experience before 14 years old. A consistent proportion over the years was observed with approximately three quarters of men having their first sex with male partners.

2.3.2.2 Number of male sexual partners

No clear changes are apparent in the number of lifetime male sexual partners. Approximately 50% of respondents had more than 20 lifetime male sexual partners. Compared to the 2002 and 2004 samples, the 2006 sample was less likely to have extremely high numbers of male partners ($\geq 100$) (13.1% in 2006 vs. 22.8% in 2002 and 23.7% in 2004).

Most respondents reported having $\geq 2$ male sexual partners (multiple partners) in the past six months: 86.5% in 2002, 76.0% in 2004 and 91.6% in 2006. The proportion in 2006 was significantly higher than that in 2002 and 2004. If the threshold was set at more than six male partners in the past six months, the figures were 48.8% in 2002, 39.9% in 2004 and 55.5% in 2006, respectively.
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The median number of male sexual partners during the previous six months was seven (25th-75th percentiles: 3-17) in 2006. It was significantly higher (Kruskal-Wallis test, \( \chi^2 = 32.58, p < 0.001 \)) than that in 2002 (5, with 25-75th percentiles of 3-12) and 2004 (4, with 25-75th percentiles of 2-10). Over 15% of respondents in 2006 had more than 20 male sexual partners in the last six months, compared with 9.2% in 2002 and 9.6% in 2004.

Factors associated with the number of male sexual partners in the past six months are further explored in multivariate analyses (Table 2.3). After controlling for age and sexual orientation, men recruited in 2006 were approximately 2.6 times (95% CI 1.92 to 3.42, \( p < 0.001 \)) more likely to have more than six sexual partners in the past six months than the men surveyed in 2002. No significant difference in the number of partners appeared between 2002 and 2004.

Having more than six male partners was also associated with older age (AOR 1.84, 95% CI 1.38 to 2.44), homosexual orientation (AOR 1.46, 95% CI 1.07 to 2.01), having first sex at less than 18 years old (AOR 1.53, CI 1.16 to 2.02), paying for sex (AOR 2.34, 95% CI 1.39 to 3.94), exchanging sex for money (AOR 4.31, 95% CI 2.59 to 7.17), and history of STD (AOR 2.25, CI 1.49 to 3.40) (Table 2.3). No significant association between the number of male partners and living with a male was observed in logistic analysis.
### Table 2.3 2 Risk behaviors among MSM in Harbin by year of survey

<table>
<thead>
<tr>
<th>Variables</th>
<th>2002 (n = 215)</th>
<th>2004 (n = 397)</th>
<th>2006 (n = 647)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age of first sex a</td>
<td>18</td>
<td>(16-21)</td>
<td>18</td>
<td>(16-20)</td>
</tr>
<tr>
<td>Gender of first sexual partner (male)</td>
<td>70.3</td>
<td>149</td>
<td>75.8</td>
<td>291</td>
</tr>
<tr>
<td>Life time no. of female sexual partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>29.6</td>
<td>60</td>
<td>53.2</td>
<td>202</td>
</tr>
<tr>
<td>1</td>
<td>49.8</td>
<td>101</td>
<td>34.0</td>
<td>129</td>
</tr>
<tr>
<td>≥ 2</td>
<td>20.7</td>
<td>42</td>
<td>12.9</td>
<td>49</td>
</tr>
<tr>
<td>Having sex with women in the previous six months</td>
<td>40.5</td>
<td>85</td>
<td>19.0</td>
<td>70</td>
</tr>
<tr>
<td>Life time no. of male sexual partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>33.0</td>
<td>68</td>
<td>33.9</td>
<td>126</td>
</tr>
<tr>
<td>11-20</td>
<td>23.8</td>
<td>49</td>
<td>17.7</td>
<td>66</td>
</tr>
<tr>
<td>21-50</td>
<td>13.6</td>
<td>28</td>
<td>11.3</td>
<td>42</td>
</tr>
<tr>
<td>51-100</td>
<td>6.8</td>
<td>14</td>
<td>13.4</td>
<td>50</td>
</tr>
<tr>
<td>≥ 101</td>
<td>22.8</td>
<td>47</td>
<td>23.7</td>
<td>88</td>
</tr>
<tr>
<td>No. of male sexual partners in the past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3.4</td>
<td>7</td>
<td>5.4</td>
<td>18</td>
</tr>
<tr>
<td>1</td>
<td>10.1</td>
<td>21</td>
<td>18.6</td>
<td>62</td>
</tr>
<tr>
<td>2-5</td>
<td>37.7</td>
<td>78</td>
<td>36.0</td>
<td>120</td>
</tr>
<tr>
<td>6-20</td>
<td>39.6</td>
<td>82</td>
<td>30.3</td>
<td>101</td>
</tr>
<tr>
<td>≥ 21</td>
<td>9.2</td>
<td>19</td>
<td>9.6</td>
<td>32</td>
</tr>
<tr>
<td>Condom use during insertive anal intercourse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>41.8</td>
<td>71</td>
<td>32.5</td>
<td>86</td>
</tr>
<tr>
<td>Sometimes</td>
<td>41.8</td>
<td>71</td>
<td>46.4</td>
<td>123</td>
</tr>
<tr>
<td>Always</td>
<td>16.4</td>
<td>28</td>
<td>21.1</td>
<td>56</td>
</tr>
<tr>
<td>Condom use during receptive anal intercourse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>48.4</td>
<td>59</td>
<td>33.1</td>
<td>79</td>
</tr>
<tr>
<td>Sometimes</td>
<td>37.7</td>
<td>46</td>
<td>47.7</td>
<td>107</td>
</tr>
<tr>
<td>Always</td>
<td>13.9</td>
<td>17</td>
<td>22.2</td>
<td>53</td>
</tr>
</tbody>
</table>

Note: Number of respondents answering each question might vary because of missing values.

- a Median (25%-75%); Kruskal Wallis test.
- b Pearson Chi square tests
- c Chi square test for linear trend
### Table 2.3.2 Risk behaviors among MSM in Harbin by year of survey, continued

<table>
<thead>
<tr>
<th>Variables</th>
<th>2002 (n = 215)</th>
<th></th>
<th>2004 (n = 397)</th>
<th></th>
<th>2006 (n = 647)</th>
<th></th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condom use during anal sex in the past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>35.9 (69)</td>
<td>25.3</td>
<td>77 (9.9)</td>
<td>6.8 (56)</td>
<td>23 (9.9)</td>
<td>6.8 (56)</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>43.8 (84)</td>
<td>56.1</td>
<td>171 (61.6)</td>
<td>6.8 (349)</td>
<td>7.2 (349)</td>
<td>6.8 (349)</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>13.5 (26)</td>
<td>16.7</td>
<td>51 (24.5)</td>
<td>16.7 (139)</td>
<td>12.9 (83)</td>
<td>16.7 (139)</td>
<td></td>
</tr>
<tr>
<td>No anal sex</td>
<td>6.8 (13)</td>
<td>2.0</td>
<td>6 (4.1)</td>
<td>1.5 (23)</td>
<td>7.2 (46)</td>
<td>1.5 (23)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Ever paying for sex with commercial partners</td>
<td>23.6 (50)</td>
<td>7.7</td>
<td>30 (7.2)</td>
<td>7.2 (46)</td>
<td>7.2 (46)</td>
<td>7.2 (46)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Paying for sex in the past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With male partners</td>
<td>20.3 (43)</td>
<td>6.7</td>
<td>26 (5.6)</td>
<td>5.6 (36)</td>
<td>5.6 (36)</td>
<td>5.6 (36)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>With female partners</td>
<td>3.3 (7)</td>
<td>2.3</td>
<td>9 (0.6)</td>
<td>0.6 (4)</td>
<td>0.6 (4)</td>
<td>0.6 (4)</td>
<td>0.011</td>
</tr>
<tr>
<td>Ever exchanging sex for money</td>
<td>26.4 (56)</td>
<td>11.5</td>
<td>44 (12.9)</td>
<td>12.9 (83)</td>
<td>12.9 (83)</td>
<td>12.9 (83)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With male clients</td>
<td>20.9 (45)</td>
<td>10.6</td>
<td>42 (11.3)</td>
<td>11.3 (73)</td>
<td>11.3 (73)</td>
<td>11.3 (73)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>With female clients</td>
<td>2.8 (6)</td>
<td>0.8</td>
<td>3 (0.0)</td>
<td>0.0 (0)</td>
<td>0.0 (0)</td>
<td>0.0 (0)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Injecting drug use</td>
<td>6.1 (13)</td>
<td>2.1</td>
<td>8 (0.2)</td>
<td>0.2 (1)</td>
<td>0.2 (1)</td>
<td>0.2 (1)</td>
<td>0.017</td>
</tr>
<tr>
<td>STD History</td>
<td>32.2 (68)</td>
<td>19.0</td>
<td>74 (10.2)</td>
<td>10.2 (65)</td>
<td>10.2 (65)</td>
<td>10.2 (65)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Syphilis</td>
<td>2.4 (5)</td>
<td>2.6</td>
<td>10 (2.8)</td>
<td>2.8 (18)</td>
<td>2.8 (18)</td>
<td>2.8 (18)</td>
<td>0.156</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>15.2 (32)</td>
<td>10.8</td>
<td>42 (7.4)</td>
<td>7.4 (47)</td>
<td>7.4 (47)</td>
<td>7.4 (47)</td>
<td>0.003</td>
</tr>
<tr>
<td>Chlamydia infection</td>
<td>0.5 (1)</td>
<td>1.3</td>
<td>5 (1.1)</td>
<td>1.1 (7)</td>
<td>1.1 (7)</td>
<td>1.1 (7)</td>
<td>0.640</td>
</tr>
<tr>
<td>Non-specific genital ulceration</td>
<td>2.8 (6)</td>
<td>1.5</td>
<td>6 (2.0)</td>
<td>2.0 (13)</td>
<td>2.0 (13)</td>
<td>2.0 (13)</td>
<td>0.554</td>
</tr>
<tr>
<td>Genital warts (HPV)</td>
<td>7.1 (15)</td>
<td>5.6</td>
<td>22 (3.0)</td>
<td>3.0 (19)</td>
<td>3.0 (19)</td>
<td>3.0 (19)</td>
<td>0.020</td>
</tr>
<tr>
<td>Genital herpes</td>
<td>4.3 (9)</td>
<td>1.5</td>
<td>6 (2.5)</td>
<td>2.5 (16)</td>
<td>2.5 (16)</td>
<td>2.5 (16)</td>
<td>0.125</td>
</tr>
<tr>
<td>HIV prevalence</td>
<td>1.3 (2/154)</td>
<td>0.9 (3/320)</td>
<td>2.2 (15/674) CI</td>
<td>1.3 (2/154)</td>
<td>0.9 (3/320)</td>
<td>2.2 (15/674) CI</td>
<td>1.3 (2/154)</td>
</tr>
</tbody>
</table>

Note: Number of respondents answering each question might vary because of missing values.
* Pearson Chi square tests
### Table 2.3 3 Factors associated with the number of male sexual partners in the past six months

<table>
<thead>
<tr>
<th>Variables</th>
<th>≥ 6 male sexual partners in the past six months (n = 970)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Year of survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>0.70</td>
<td>0.49-0.99</td>
</tr>
<tr>
<td>2006</td>
<td>1.31</td>
<td>0.95-1.78</td>
</tr>
<tr>
<td>Age (≥ 31 vs. ≤ 30)</td>
<td>1.48</td>
<td>1.17-1.88</td>
</tr>
<tr>
<td>living with someone (Yes vs. No)</td>
<td>1.07</td>
<td>0.84-1.36</td>
</tr>
<tr>
<td>Occupation (Student vs. Non-students)</td>
<td>0.45</td>
<td>0.32-0.62</td>
</tr>
<tr>
<td>Self reported sexual orientation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gay vs. bisexual/heterosexual/undecided</td>
<td>1.36</td>
<td>1.04-1.77</td>
</tr>
<tr>
<td>First sex at ≤ 18 years</td>
<td>0.86</td>
<td>0.76-0.96</td>
</tr>
<tr>
<td>No sex with women in the past six months</td>
<td>1.12</td>
<td>0.86-1.46</td>
</tr>
<tr>
<td>Paid for sex in the past six months</td>
<td>2.83</td>
<td>1.81-4.41</td>
</tr>
<tr>
<td>Exchanged sex for money in the past six months</td>
<td>3.77</td>
<td>2.52-5.61</td>
</tr>
<tr>
<td>Life time history of STD</td>
<td>2.74</td>
<td>1.96-3.81</td>
</tr>
<tr>
<td>Had never been tested for HIV</td>
<td>1.01</td>
<td>0.73-1.37</td>
</tr>
</tbody>
</table>
2.3.2.3 Anal sex and condom use with males

The proportion of MSM who had anal sex in the last six months was continually at a high level over the study period: 94.3% in 2006, which is little different from that in 2002 (90.3%) and 2004 (93.1%). No significant differences were observed in terms of condom use between students and non-students. As shown in Table 2.3 2, using 2002 results as baseline, there were significant changes in the use of condoms during insertive and receptive anal intercourse: the proportion of men who never used a condom during anal intercourse in the past six months decreased over the study period (Chi square test for linear trend: $\chi^2 = 52.49, p < 0.001$ for insertive anal intercourse; $\chi^2 = 37.34, p < 0.001$ for receptive anal intercourse). Consistent with this, the proportion of men who always used condoms during anal intercourse in the past six months increased significantly (Chi square test for linear trend: $\chi^2 = 29.26, p < 0.001$ for insertive anal intercourse; $\chi^2 = 13.46, p < 0.001$ for receptive anal intercourse) (Figure 2.3).

No significant difference was found in terms of whether participants were more likely to use condoms during receptive anal sex than in insertive anal sex. There was a marginal trend towards a higher proportion never using a condom and lower proportion always using a condom when having receptive anal sex.

Consistent condom use in anal sex is an important indicator for HIV/AIDS transmission among MSM. The definition of this indicator is the number of respondents who used a condom every time they had anal sex with male partners in the past six months divided by the number of respondents who have had anal sex with a male partner at least once in the past six months. The reverse of the indicator refers to the prevalence of unprotected
Chapter two: Community-based HIV/AIDS surveillance

Anal intercourse (UAI). The denominator of this indicator in this study was defined as the number of participants who were eligible to participate including those who did not have anal sex in the past six months. Based on this definition, there was a significant increase in the proportion of men who used a condom every time during anal sex in the past six months, although the prevalence of UAI among all participants in 2006 was still at a very high level (74.6%).

After controlling for age and living with a male sexual partner, multivariate analysis indicated that the changes in condom use during anal sex with male partners in the past six months were still significant (Table 2.3). The prevalence of never use a condom during anal sex in the past six months decreased significantly from 2002 to 2006, while the proportion of MSM who always used a condom during insertive and/or receptive anal sex in the past six months increased significantly from 2002 to 2004, and no significant difference emerged between 2004 and 2006.

Condom use during anal sex is also associated with other factors as shown in Table 2.3. MSM who never used condoms during anal sex in the previous six months were older, more likely to have a history of STDs, less likely to have more than six partners in the past six months and more likely to have sex with male sex workers. Those who always used a condom during anal sex were less likely to be living with a male partner, less likely to have a history of STD, and more likely to have been tested for HIV before.
Figure 2.3 Percent of MSM reporting condom use during anal sex with males in the past six months in Harbin: 2002-2006
### Table 2.3 4 Factors associated with condom use during anal sex, Logistic analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Condom use during anal sex in the past six months (n = 826)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never use a condom</td>
<td>AOR (95% CI)</td>
<td>P Value</td>
<td>Always use condoms</td>
<td>AOR (95% CI)</td>
</tr>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td></td>
<td></td>
<td>OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Year of survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>0.55 (0.37-0.82)</td>
<td>0.61 (0.37-0.99)</td>
<td>0.032</td>
<td>1.21 (0.72-2.02)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>0.18 (0.12-0.28)</td>
<td>0.23 (0.14-0.37)</td>
<td>&lt; 0.001</td>
<td>2.02 (1.28-3.19)</td>
<td>1.78 (1.22-2.57)</td>
</tr>
<tr>
<td>Age (≥ 31 vs. ≤ 30)</td>
<td>1.76 (1.29-2.41)</td>
<td>1.75 (1.19-2.57)</td>
<td>0.004</td>
<td>0.92 (0.68-1.25)</td>
<td></td>
</tr>
<tr>
<td>Living with a male partner (Yes vs. No)</td>
<td>0.65 (0.46-0.92)</td>
<td></td>
<td></td>
<td>1.07 (0.78-1.46)</td>
<td>0.65 (0.47,0.91)</td>
</tr>
<tr>
<td>Occupation (Student vs. Non-students)</td>
<td>0.56 (0.35-0.90)</td>
<td></td>
<td></td>
<td>0.79 (0.52-1.21)</td>
<td></td>
</tr>
<tr>
<td>Self reported sexual orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gay vs. bisexual/heterosexual/undecided</td>
<td>0.83 (0.59-1.17)</td>
<td></td>
<td></td>
<td>0.85 (0.61-1.19)</td>
<td></td>
</tr>
<tr>
<td>First sex at ≤18 years old</td>
<td>0.99 (0.85-1.16)</td>
<td></td>
<td></td>
<td>1.03 (0.88-1.20)</td>
<td></td>
</tr>
<tr>
<td>Number of male sexual partners in the past six months (≥ 6 vs. ≤ 5)</td>
<td>0.60 (0.38-0.96)</td>
<td>0.57 (0.38-0.86)</td>
<td>0.001</td>
<td>0.79 (0.58-1.08)</td>
<td></td>
</tr>
<tr>
<td>No sex with women in the past six months</td>
<td>1.06 (0.74-1.51)</td>
<td></td>
<td></td>
<td>0.69 (0.49-0.96)</td>
<td></td>
</tr>
<tr>
<td>Paid for sex in the past six months</td>
<td>2.78 (1.79-4.33)</td>
<td>1.70 (1.03,2.92)</td>
<td>0.040</td>
<td>1.02 (0.62-1.70)</td>
<td></td>
</tr>
<tr>
<td>Exchanged sex for money in the past six months</td>
<td>1.21 (0.78-1.85)</td>
<td></td>
<td></td>
<td>0.82 (0.52-1.29)</td>
<td></td>
</tr>
<tr>
<td>Life time history of STD</td>
<td>3.15 (2.22-4.78)</td>
<td>2.93 (1.85-4.64)</td>
<td>&lt; 0.001</td>
<td>0.51 (0.32-0.81)</td>
<td>0.63 (0.41-0.96)</td>
</tr>
<tr>
<td>Had never been tested for HIV</td>
<td>0.84 (0.57-1.24)</td>
<td></td>
<td></td>
<td>0.60 (0.42-0.87)</td>
<td>0.43 (0.23-0.81)</td>
</tr>
</tbody>
</table>
2.3.2.4 Commercial sex behaviors

In this study, commercial sex behaviors referred to two different situations: men paying for sex with commercial male or female partners and men exchanging sex for money with male or female clients. Using the 2002 study as baseline, decreasing trends in the proportion of men who had commercial sex behaviors have been observed in both situations as shown in Table 2.3 2. In 2002, 20.3% of men paid for sex with male partners in the past six months, while the proportion decreased to around 6% in 2004 and 2006. Consistently, the proportion of men who exchanged sex for money with male clients in the past six months in 2002 (20.9%) was significantly higher than these in 2004 (10.6%) and 2006 (11.3%).

2.3.2.5 Having sex with females

Approximately half the men recruited in 2004 and 2006 ever had sex with women. The 2002 survey indicated a higher proportion of men ever having sex with women (70.4%), and a higher proportion having more than two female partners (20.7%). Around 20% had sex with females in the previous six months in 2004 and 2006, with the prevalence in 2002 a higher 40.5%. (Table 2.3 2)

2.3.3 Injecting drug use

Few respondents from the three surveys reported having injected illegal drugs. The prevalence of injecting drug use tended to decrease: it was 6.1% in 2002, 2.1% in 2004, but 0.2% in 2006. Very few respondents reported ever having shared needles. (Table 2.3 2)
2.3.4 HIV prevalence and STD history

As shown in Table 2.3, the HIV prevalence among MSM across the three study years remained at a relatively low level. The prevalence in 2006 (2.2\%: 15/674, 95\% CI: 1.3-3.6\%) was higher than that in 2002 (1.3\% (2/154), 95\% CI: 0.2-4.55) and 2004 (0.94\% (3/320), 95\% CI: 0.2-2.7\%). This change was not statistically significant. Of the fifteen participants who were screened HIV positive in 2006, two reported being sex workers for men.

Among men in 2002, 32.3\% (68/211) reported ever having been infected with a sexually transmitted disease. As shown in Figure 2.4, along with an increase in condom usage during anal sex, the proportion of men who had a history of STD declined significantly over the study period (19.0\% (74/320) in 2004 and 10.2\% (65/674) in 2006).

Gonorrhea infection was the most common reported sexually transmitted infection. Approximate 15\% reported having a history of Gonorrhea infection in 2002. The rate decreased to 10.8\% in 2004 and 7.4\% in 2006. Syphilis infection has continually remained at a low level. Fewer than 3\% reported having a history of Syphilis.
Figure 2.4 HIV prevalence and STD history and Consistent condom use with male partners in the past six months: 2002-2006
2.3.5 Knowledge about HIV prevention and condom use

As mentioned in Section 2.2.7, it might be inappropriate to track changes in HIV/AIDS knowledge based on these data because of changes to the questionnaires. In this section, only descriptive analyses of the knowledge level about HIV/AIDS among the study population are provided.

In 2002 and 2004, nine true-or-false questions were used to evaluate respondents’ knowledge about HIV/AIDS and four questions evaluated misconceptions about condom use (Table 2.3.5). The rates of correct responses to questions about AIDS were higher in 2002 than in 2004, but no significant differences were observed (The median score for AIDS knowledge in both years was seven (range 1-9)). Over three quarters had basic knowledge of HIV transmission routes: sharing unclean needles, having sex without using condoms and mother-to-child transmission. Many, however, had misconceptions about risky sexual practices. For example, approximate 30% thought they would not be infected with HIV if they cleaned their anus and penis before and after sex and over 40% believed if they withdrew before ejaculation or did not ejaculate inside when having sex they would be protected from HIV.

The median score for condom knowledge was two in both years (range 1-4). A substantial proportion of respondents had misconceptions about the use of condom. More than 40% did not know that some space should be left at the tip of a condom for semen and over half thought cooking oils or Vaseline could be used as lubricants for condoms.
Using the new indicators in the 2006 survey (Table 2.3 6), around two-thirds (63.4%) of the respondents answered correctly at least nine of ten questions. Fewer than 5% answered less than six questions correctly. Although most respondents had a relatively good understanding of HIV knowledge, some still had misconceptions about HIV transmission, e.g. over 30% did not know breast feeding could transmit HIV and more than a quarter believed that people could get HIV from mosquito bites.
Table 2.3 5 Percent of respondents who correctly answered the questions about HIV/AIDS and condom knowledge, 2002-2004

<table>
<thead>
<tr>
<th>Variables (correct answer: True or False)</th>
<th>2002</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>AIDS knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A person will be infected with HIV if he/she has sex with foreigners. (false)</td>
<td>145</td>
<td>68.7</td>
</tr>
<tr>
<td>A person will not be infected with HIV if he/she has sex with people who look clean and healthy. (false)</td>
<td>165</td>
<td>78.2</td>
</tr>
<tr>
<td>A person will be infected with HIV if sharing needles with people who are HIV positive. (true)</td>
<td>190</td>
<td>90.1</td>
</tr>
<tr>
<td>An HIV positive person without any AIDS related symptoms will not transmit the HIV to other people. (false)</td>
<td>136</td>
<td>64.5</td>
</tr>
<tr>
<td>An HIV positive person will transmit the HIV virus to other people if he/she has sex without a condom. (true)</td>
<td>160</td>
<td>75.8</td>
</tr>
<tr>
<td>A person will not be infected with HIV if he/she only has sex with people he/she trusts. (false)</td>
<td>157</td>
<td>74.4</td>
</tr>
<tr>
<td>If a man cleans his anus and penis before and after sex, then he will not be infected with HIV. (false)</td>
<td>151</td>
<td>71.6</td>
</tr>
<tr>
<td>If a man withdrawals before ejaculation or doesn’t ejaculate inside when having sex, then he will not transmit HIV to others. (false)</td>
<td>125</td>
<td>59.2</td>
</tr>
<tr>
<td>A pregnant women infected with HIV can transmit the virus to her unborn child. (true)</td>
<td>181</td>
<td>85.8</td>
</tr>
<tr>
<td>Condom Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The condom should be kept unrolled before putting on a man’s penis. (true)</td>
<td>134</td>
<td>63.5</td>
</tr>
<tr>
<td>Some space should be left at the top of a male condom for sperm. (true)</td>
<td>147</td>
<td>69.7</td>
</tr>
<tr>
<td>A used condom can be reused after cleaning. (false)</td>
<td>192</td>
<td>91.0</td>
</tr>
<tr>
<td>Cooking oils or Vaseline can be used for lubrication when using a condom. (false)</td>
<td>95</td>
<td>45.0</td>
</tr>
</tbody>
</table>
Table 2.3 6 Percent of respondents who had correct knowledge and beliefs about HIV prevention, 2006

<table>
<thead>
<tr>
<th>Variables (correct answer)</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can a healthy-looking person have HIV? (yes)</td>
<td>519</td>
</tr>
<tr>
<td>Can a person be infected with HIV if using blood or blood products that are contaminated with HIV? (yes)</td>
<td>618</td>
</tr>
<tr>
<td>Can a person be infected with HIV if sharing needles with people who are HIV positive? (yes)</td>
<td>616</td>
</tr>
<tr>
<td>Can the risk of HIV transmission be reduced by using condoms correctly? (yes)</td>
<td>586</td>
</tr>
<tr>
<td>Can the risk of HIV transmission be reduced by having sex with only one faithful, uninfected partner? (yes)</td>
<td>570</td>
</tr>
<tr>
<td>Can a pregnant woman who is infected with HIV transmit the virus to her unborn child? (yes)</td>
<td>562</td>
</tr>
<tr>
<td>Can a HIV infected women transmit the HIV virus to her children by breast feeding? (yes)</td>
<td>417</td>
</tr>
<tr>
<td>Can a person be infected with HIV by regular contacts with people who are infected? (no)</td>
<td>543</td>
</tr>
<tr>
<td>Can a person get HIV from sharing a meal with someone who is infected? (no)</td>
<td>538</td>
</tr>
<tr>
<td>Can a person get HIV from mosquito bites? (no)</td>
<td>472</td>
</tr>
</tbody>
</table>
2.4 DISCUSSION

There are limited data to track trends in risk behaviors and HIV prevalence among MSM in China [135]. This research fills the gap in this area. It presents changes in HIV prevalence and sexual behavior among MSM in Harbin over three time points.

2.4.1 Demographic characteristics

Although significant statistical differences were found over the three year study period in terms of the distribution of age, education and occupation, these samples are broadly comparable. The 2004 sample was younger and better educated because of the disproportionate recruitment of students. In the multivariate analyses, however, no significant associations were found between student status and key risk indicators, such as UAI and the number of male sexual partners in the past six months. Therefore the potential selection bias caused by recruiting more students in 2004 should have little impact on tracking changes in risk behaviors. These data will provide valuable information for better understanding behavioral changes among Chinese MSM.

Our findings indicate that MSM increasingly identify themselves as homosexual over the study period—a relatively short period, and accordingly more are choosing to live with a male partner. Although no direct information about the reasons for such changes has been collected in this study, both changing attitudes to homosexuality in Chinese society and changing attitudes among the MSM community may contribute to this phenomenon. We believe this could be due to: Firstly, Chinese society is becoming more tolerant of homosexuality, although Chinese MSM still face serious social problems at multiple levels, such as stigmatization, and pressure to get married.
and have children [3, 131]. Persecution from police under anti-hooliganism laws, losing employment or being the target of blackmail and discrimination from health providers are less likely to happen in Chinese society today than before; Secondly, since late 1990’s, gay venues where gay people gather, as well as gay websites, have appeared in China [43]. These venues firstly emerged in Beijing and then to other major cities. In recent years, gay organized communities or organizations have been found in many cities, and many of them have engaged with HIV/AIDS prevention and intervention programs. These organizations provide a platform for MSM to get information and communication, and enhance their understanding and self reorganization of homosexuality, which make them more open and clear about their sexual orientation. However, no direct measures of experience of discrimination or perceived legal and social acceptance are collected in this study. The relationship between openness about being homosexual and social acceptance and their association with HIV/AIDS risk behaviors should be studied in future.

The increasing trend in self-identifying as homosexual and the decline in bisexuality may serve as good signs in the context of HIV prevention. Homosexual men are more likely to choose to live with a male partner and less likely to have sex with females. This study showed that, compared with 2002, the proportion of men who had sex with women in the past six months decreased significantly in 2004 and 2006. These changes are helpful in reducing the bridging role of the MSM population—the possibility of HIV spread from the risky MSM population to a wider population of women and their other male partners [136]. In addition, living with a male partner or engaging in a stable relationship may potentially reduce MSM’s opportunity to have causal or commercial partners. In Chapter 4, the online survey did find that MSM who are in a stable relationship carry less risk for HIV infection than those who are
not. Therefore, creating a liberal society and encouraging gay men to have stable and faithful relationships might be regarded as an effective option for the prevention of HIV transmission in China.

2.4.2 Sexual behavior and condom use

Unprotected anal sex is by far the highest risk behavior for HIV transmission among MSM [43, 137]. Most health promotion interventions in this specific group aim both to decrease the number of partners and to increase condom use in all partnerships [137]. This study shows that the MSM in this northern Chinese city are vulnerable to HIV in view of their high number of sexual partners and low consistent condom use during anal sex.

The majority of MSM in Harbin are sexually active. There is no sign of any delayed sexual initiation. The median age of first sex was around 17 years old. Most respondents reported having multiple male partners (more than one sexual partner) in the past six months and around half had more than six partners. High turnover of lifetime partnerships is also observed over the three years study period. Around 30% reported having more than 50 male partners prior to the investigation. The above findings indicate that a high proportion of the population engages in relatively high risk partnerships and therefore is more likely to be exposed to sexual networks within which HIV can circulate [43]. Since high partnership turnover is a prime determinant of the early spread of HIV, prevention programs that discourage a high number of partnerships and encourage mutual monogamy are important at this early stage of the HIV epidemic among MSM in China.

Both bivariate and multivariate analyses showed that the men recruited in 2006 were more likely to have a higher number of male sexual partners in the past six months.
than respondents in 2002 and 2004. A recent published study among MSM in Beijing also indicates a trend towards an increasing number of male sexual partners in the past six months from 2004 to 2006 [83]. However, it is difficult to infer the reason for the increase in the number of male partners based on the information collected in our study. Studies in developed countries have indicated that MSM are avid users of the Internet to look for sexual partners and the Internet has emerged as a new risk meeting place for MSM [18, 22, 89, 115]. In China the number of people accessing the Internet has been increasing dramatically in recent years [17]. Several studies indicate that the Internet has become one of the most important media for Chinese MSM to seek sexual partners [17, 43, 103]. The ease of seeking sexual partners through the Internet might be a contributor to the increasing number of sexual partners. No studies, however, have been conducted to explore the roles of the Internet in the sex seeking process among the Chinese MSM population. This merits further investigation.

It should be noted that the sampling strategy used in this study focuses on cruising areas and other areas (traditional gay venues) where MSM may congregate specifically to seek sexual partners. Thus participants may have a higher turnover of sexual partners and they are likely to be at the higher end of the spectrum of risk behavior [138]. Those who less often frequent these venues may not appear in the study sample. Therefore, the samples may represent individuals of greatest interest to HIV prevention programs.

The results of this study, however, do show some encouraging trends in the reduction of risk behaviors. The proportion of MSM who always use condoms during anal sex has continually increased over the study period and there is a significant decrease in
the proportion of men who never use condoms. Compared with a similar survey among 426 MSM between 1997 and 1998 in China, in which about one-third of MSM never used a condom during anal sex [138], the prevalence has declined to around 10% in 2006. However, it is difficult to determine whether the increase in condom use recorded in the study represents success of the HIV/AIDS intervention strategy in Harbin, since information on HIV prevention and intervention programs that the respondents accessed was not collected. In addition, the prevalence of condom use recorded in this study does not vary by regular and non-regular partners. A recent published study that evaluated behavioral changes among MSM in Beijing from 2004 to 2006 showed no significant changes in condom use both in receptive and insertive anal intercourse [18]. However, this study has similar issues as our study that it did not evaluate sexual behaviors by distinguishing between regular and non-regular partners. Should MSM not use condoms when having sex with regular partners, but increasingly use condoms with non-regular partners, the observed changes in condom use based on the indicator used in this study may underestimate the true levels of risk reduction in this population [89]. This needs to be further studied.

The MSM population in Harbin is still vulnerable to HIV infection, although an increase in condom use has been observed. In addition to those who never used condoms, more than 50% of respondents only use condom sometimes (but not always). There is little evidence that using condoms sometimes provides any greater protection than not using condoms at all. A study conducted in Uganda, for example, found that those who sometimes used condoms were at higher risk of infection than those who never used them, perhaps because they were more risky in other aspects of their sexual behaviors, such as the number of partners they had [25]. Clear evidence
has been documented among MSM and female sex workers that people can be convinced to use condoms [26, 27]. Therefore, effective condom promotion strategies are really necessary to convince MSM to use condoms consistently in China.

2.4.3 Commercial sexual behavior

The proportion of MSM who exchanged sex for money in the past six months decreased in Harbin over the study period from 20.9% in 2002 to 11.3% in 2006. In parallel, there is a significant decrease in the prevalence of exchanging money for sex from 20.3% in 2002 to 5.6% in 2006. Approximately 13% of respondents engaged in commercial sex in the six months prior to the survey in 2006. Several surveys among Chinese MSM show similar trends in the proportion of MSM who engage in commercial sex. A cross-sectional study conducted in Beijing in 2002, for example, found that nearly one in four men sampled reported receiving money from men for sex in the past six months [28]. While a survey conducted in 2006 among 1,389 MSM in six major Chinese cities show that 9.5% had sex with male sex workers in the past six months and 11.7% exchanged sex for money in the same period of time [29].

The decrease in the proportion of MSM who engage in commercial sex indicates a reduction in risk behavior [139]. Male sex workers as well as MSM who pay for sex have a high turnover of male partners and are repeatedly exposed to the risk of HIV infection. Therefore these groups carry a higher risk for HIV transmission [87]. This study supports this observation. As shown in Table 2.3, MSM who exchanged sex for money in the past six months were 4.3 times more likely to have ≥ 6 male sexual partners than those who did not. Similar to this, those who paid for sex in the past six
months were 2.3 times more likely to have over six male partners than those who did not. Studies have also indicated that MSM who trade sex for money are more likely to engage in UAI [41, 89]. In this study, no significant difference was observed in the prevalence of condom use between male sex workers and others, but MSM who paid for sex in the past six months were more likely to never use a condom than others when having anal sex. Male sex workers, so called “money boys” in China, rarely insist on condom use when given extra money [18]. Since men selling sex to men are becoming an identifiable population in China, separate tailored prevention and intervention programs should be developed immediately for them [89].

However, selection bias should be considered when drawing a conclusion about the prevalence or a decline in the proportion of paying/selling sex among the MSM population. Firstly, the proportion of MSM with commercial sexual behaviors in a survey sample is likely to be affected by the sampling method, especially when participants are recruited in traditional gay venues and the sample size is small. Traditional gay venues in China are important places for male sex workers to seek clients. If owners of gay bars or bath houses are involved as recruiters in surveys, male sex workers cruising in these places are more likely to be persuaded to participate in the survey compared with other MSM because of their “working relationships”. This may lead to a higher proportion of respondents who are sex workers. Secondly, there were not many “professional” male sex workers in China in 2002. Entertainment establishments for MSM were relative simple at that time. Gay men usually cruised in traditional gay venues and exchanged sex for money occasionally. In 2006, there has been a burgeoning of the hospitality and entertainment industry where male and female sex services are provided in some
provincial capital cities of China. Those who used to cruise in traditional venues might switch to these newly emerged entertainment establishments, and they are even more difficult to reach than before [18]. Because the sample size of the 2002 sample was small, the possibility of over sampling male sex workers might exist and might contribute to the apparent decline in the prevalence of male commercial sex behaviors as observed in this study.

2.4.4 HIV prevalence

Although high risk sexual behaviors make the MSM population highly vulnerable to HIV/AIDS, the HIV prevalence among this population in Harbin has remained at a relatively lower level. These results are similar to several other surveys conducted in other major cities in China (Gaungzhou-1.7% [140], Shenyang-1.2% [141], Beijing-3.2% [142], 0.9% in six cities [43], Shangahi-1.5% [87]). Why is the HIV prevalence low among MSM while high-risk sexual behaviors are so common? Perhaps it is because injecting drug use is rare in this specific population. China’s HIV/AIDS epidemic follows a chain of transmission similar to other Asian countries [18], where an HIV epidemic occurs initially among injecting drug users (IDUs), followed by the spread among female sexual workers (FSWs). As the next link in the chain, clients of FSWs then can transmit the virus to their female partners and to the general population. The small overlap between the MSM and IDU populations may slow the rate of HIV spread from IDUs to MSM. Our study results indicate that few MSM respondents ever injected drugs in Harbin. Surveys in other cities show similar low injecting drug use among this group [18, 42, 43]. The low prevalence of injecting drug use among MSM also indicates that currently male-male sex transmission may still be the main mode of HIV transmission among MSM. This may raise concerns
about HIV transmission among the MSM in western China (e.g. Yunnan and Xinjiang provinces) where injecting drug use is a serious issue. In addition, with the reform of economy reform starting in the late 1970s, a huge population of temporary migrants has emerged in China. The link between population mobility and the spread of HIV/AIDS has been well established [43]. Population mobility not only breeds social and behavioral changes that make temporary migrants vulnerable to HIV, but also potentially acts as a transporter of HIV. The movement of infected persons might in turn offer a convenient vehicle to transport HIV/AIDS to places where they are previously unknown [133].

Although no statistically significant differences are observed in HIV prevalence, based on serological data across the study years, no decrease in HIV transmission was noted. The 2006 sample was 1.71 times more likely to be infected with HIV than the 2002 sample (PR 1.71, 95% CI 0.40 to 7.42). However this study was not powered to identify changes in HIV prevalence. In this study we have noticed that six HIV positives in 2006 were recruited from the same gay bar. The chain of HIV transmission might have been established through risky sexual activities in a complex sexual network. A recent published study shows that the HIV prevalence among MSM in Beijing increased from 0.4% in 2004 to 5.2% in 2006 [43]. Given the high rate of UAI and high number of male sexual partners in this population, HIV infection rates will continually spread unless effective prevention measures are implemented [43, 54]. Continued close tracking of HIV prevalence will be conducted.

2.4.5 Knowledge of HIV prevention

Although early assumptions that knowledge about AIDS and how to prevent it would be adequate to lead to behavior change have proven optimistic, knowledge is a
prerequisite for behavior change [41]. Using the new indicators in 2006, the results show that respondents have good knowledge of basic HIV prevention information. Only less than 5% answered fewer than six of ten questions correctly. Two thirds correctly answered more than nine questions. However, some respondents still have misconceptions, e.g. over 30% did not know breast feeding could transmit HIV and more than a quarter thought people could get HIV from mosquito bites.

The change of surveillance indicators in 2006 makes it difficult to evaluate changes in HIV/AIDS prevention knowledge. The questions used in 2006 are designed as indicators of improvements in HIV/AIDS knowledge and are not for the evaluation of knowledge level. These questions collect more basic information than those used in 2002 and 2004. Based on the 2002 and 2004 data, there were no significant changes observed in the understanding of HIV transmission. Some participants believe that cleaning anus and penis before and after anal sex, and that no ejaculation inside can prevent them from being infected with HIV. In addition, a proportion of participants still had misconceptions about condom use, such as that cooking oils or Vaseline could be used as lubricants for condoms. Health education focusing on HIV transmission routes and correct condom use is still necessary.

2.5 LIMITATIONS

Limitations in this study should be acknowledged. Sample sizes varied across the three surveys. Only 215 men participated in 2002, when homosexual activities were facing strong social pressure in China which made the MSM population very difficult to reach [1, 87, 88]. This small sample might have an impact on study results. The social atmosphere has eased in recent years along with the appearance of
open and semi-open gay gathering places as well as AIDS education and care support programs for gay men in China.

The sampling method used in this project is also important for the generalizability of survey findings. Known gay venues were divided into three groups and sampling from each of these groups was in proportion to their estimated visitor numbers. This was undertaken to reduce the potential selection bias in sampling from a single type of venue. Subsequently a convenience sampling design was used within each group of gay venues. Therefore, if the target study-population was restricted to visitors of traditional gay venues in this city, theoretically it is assumed that visitors of these venues have equal probabilities of selection, thus the sampling plan used in this study produced self-weighted samples. However, because of the different frequency of MSM cruising in these gay venues, the samples might be potentially biased. The more frequently MSM visit gay venues, the more likely they are selected in the sample. Those who seldom visit these venues will drop out of the sampling process. Since information on the frequency of visiting gay venues was not collected in this study, sampling weights to the survey data during the data analysis are not applied to correct for unequal probabilities of selection. Thus participants might consist of MSM who were at an elevated risk for HIV infection and transmission because MSM might intentionally gather in these areas to seek partners. In addition, some gay men were not in the sampling frame because they usually meet their gay friends or seek sexual partners through telephone networks or via the Internet [143]. Therefore the target population of this study refers to MSM who frequent gay venues and results cannot be generalized to the total MSM population in the study area. It was noticed that the types and distribution of gay venues in this city were stable over the three time periods. This may reduce the bias caused by the convenience sampling method.
within each group of gay venues. Since seeking sex on the Internet has become increasingly popular among the MSM population in China, separate online surveys were conducted to describe the use of the Internet and to compare the difference between the online and venue-based MSM populations (to be reported in Chapter Four and Chapter Five). This may provide extra evidence to understand the risk of HIV among MSM in northern China. Some other sound sampling techniques such as respondent driven sampling [41] could also be used in further studies.

Exposure to HIV/AIDS interventions has not been evaluated in this project, which makes it difficult to evaluate the accessibility of intervention programs for MSM in China as well as the effect of these programs. This should be performed in future studies to clarify whether exposure to an intervention program may have contributed to any observed behavioral changes.

Another limitation of this study is that the measure of condom use during anal sex in the past six months did not distinguish between regular and non-regular partners or by HIV sero-status [87]. Couples who know their sero-status and are sero-concordant may choose not to use condoms within their steady partnership. If they use condoms in any sex with other partners, this represents no increased risk of transmission within their partnerships. Where non-use of condoms within stable partnerships is common, the measure of condom use may suggest higher levels of risk than actually exist. However, defining regular partners is very difficult as much male-male sex was clandestine and stigmatized in China in 2002. In addition only a small proportion of MSM (12%) had steady partners in 2002. Since a gradual increase in the number of MSM who are living with a male partner has been observed, to
evaluate risk behaviors by distinguishing between regular and non-regular partners will be considered in further surveys.

Finally, urine samples were used for HIV testing in this study. Urine testing has been proved a cost effective, accurate and acceptable way to screen for HIV antibodies, and it is safe and easy to use for health professionals [144]. However, urine samples may not be able to monitor some serological indicators such as syphilis and HCV prevalence that may better reflect HIV transmission risk, particularly at the stage of a low HIV epidemic.

2.6 CONCLUSION

These systematic cross-sectional surveys indicate that there have been behavioral changes among MSM in Harbin over the study period 2002-2006. An increasing proportion of MSM identify themselves as homosexual and have a steady relationship with a male partner. The prevalence of consistent condom use in anal sex has been increasing and fewer people never use a condom in anal sex. The MSM population in Harbin, however, is still vulnerable to HIV transmission in view of a high level of UAI and an increasing number of male sexual partners. The HIV prevalence in this population remains at a low level and currently male-male sex is the main HIV transmission mode. HIV infection rates might increase unless effective prevention measures are implemented and strengthened to match the scope of the potential AIDS epidemic.
CHAPTER THREE

INTERNET-BASED HIV/AIDS BEHAVIORAL SURVEYS

—Seeking sex on the Internet and sexual risk behaviors among men who have sex with men in China, 2006-2007
3.1 BACKGROUND

The Internet has become a widely used virtual meeting place facilitating sex networking among MSM in developed countries [42, 89, 91, 133, 144]. Mainstream Internet providers are providing services catering to MSM for their dating and sexual purposes: searching information sources, sending electronic mail and exchanging images, video and voice messages, and social networking (My Space and Facebook) [18]. Various factors may account for the increasing popularity of the Internet among MSM. Its anonymous nature and relative confidential environment maintains users’ privacy. The ease of connection and communication as well as numerous users make it easier for MSM to find other men for sexual purpose and social contact [79].

Studies have indicated that the Internet has become an increasing risk environment for sexually transmitted infections [84, 89, 145, 146]. MSM who seek sexual partners on the Internet are more likely to have unprotected anal intercourse (UAI), more sexual partners and a history of STD than men who seek sexual partners through other approaches [25, 26, 131, 147].

Understanding the impact of the Internet on sex seeking and HIV transmission will guide the development of HIV prevention and intervention strategies. It will also provide evidence for the development of HIV/AIDS behavioral surveillance among MSM. If the Internet has already become a risk environment for HIV transmission, surveillance systems should be located where the risk is. A number of surveys have been conducted around the world using the Internet to collect sensitive behavioral data among MSM. However, knowledge on Internet use for sexual purposes among the Chinese MSM population is rare. What are their demographic characteristics of those MSM who use the Internet for sexual purposes in China? How often do
Chinese MSM seek sex through the Internet? Are they more likely to have high-risk sexual behaviors than those who seek sex in traditional gay venues? Has the Internet become a risk environment for HIV/STI transmission for Chinese MSM as it has had in developed countries? If so, what role can the Internet play both in behavioral surveillance and creating a risk environment?

The number of people who access the Internet in China is increasing dramatically and Chinese gay men are also avid users of the Internet. By the end of 2004, for example, the number of people accessing broadband connections increased to 94 million, which represents an increase of 18.2%, or 14.5 million new users compared that in 2003 [27, 28]. In 2001, there were more than 250 Chinese websites dedicated to gays, lesbians, bisexual and transgender people. A Baidu search (www.baidu.com, a popular and powerful search engine in China) on October 2, 2007, using the key words “Gay online dating websites” (in Chinese), produced 5,900 results demonstrating the popularity of meeting potential partners online. Two recent published surveys in China showed that approximately 40% of men who socialize in gay venues have sought sex through the Internet [29, 30]. The safe and anonymous nature of the Internet may attract more Chinese MSM to seek sex or other social contacts through this medium rather than in traditional gay venues, as homosexuals are still under political and cultural pressure from society and families in China [10, 31].

As discussed in the Chapter 1, the limited data produced by current behavioral surveillance among MSM in China are insufficient to fulfill the needs for predication of a HIV epidemic and for monitoring and evaluating HIV intervention programs in this specific population. The diffusion of access to and use of the Internet in China
Chapter three: Internet-based HIV/AIDS behavioral surveys

together with advantages of internet-based surveys such as cost-effectiveness and theoretically unlimited access to potential respondents provides an unique opportunity to conduct behavioral surveys/surveillance among MSM via the Internet.

The aims of this study were to identify the main purposes for Chinese MSM to use gay websites, to explore whether the Internet has become a risk environment for HIV/STI transmission among Chinese MSM, and thus to provide evidence to develop HIV/AIDS surveillance system among MSM and to identify future directions for minimizing HIV transmission risk in the Internet era.

The objectives of this study were to:

- Examine the demographic characteristics of Chinese gay website users;
- Identify the main purposes for them to use gay websites;
- Explore the behaviors of gay website users including
  - UAI and the number of sexual partners;
  - Differences in condom use consistency between different sexual partnerships;
  - Whether men having a regular partner carry a lower risk for HIV infection than others;
  - Reasons for not using condoms during anal sex;
  - The extent to which Chinese gay website users seek sex on the Internet;
  - Use of the Internet and reasons for using the Internet for sexual purpose;
- Examine whether men who seek sex on the Internet are at higher risk for HIV infection than others who seek sex in traditional gay venues or in other ways;
Chapter three: Internet-based HIV/AIDS behavioral surveys

3.2 METHODS

3.2.1 Description of the selected gay websites

Because of limited funding and a short study period, only three Chinese gay websites—www.aixinsky.com, www.boysky.com and www.yntz.net—were selected to advertise the 2006 online survey. This survey was repeated in 2007 from April to July. The gay websites involved in this study are located in Harbin in the northeast, Shanghai in the southeast and Kunming in the southwest of China. Visitors to the three websites could cover almost all 31 Provinces in China. The websites provide similar services catering to MSM for their dating and sexual purposes, including video/voice chat rooms, profiles, forums, news for gay community and health information. The majority of their visitors are men who have sex with men. Figure 3-1 shows geographic locations of the selected gay websites.

www.aixinsky.com is a very popular gay website located in Harbin in Northeast China. It attracts more than 10,000 daily hits and has over 46,000 registered members. Most of its visitors are MSM living in northeast China. This website is financially supported by the China CDC and several international organizations. During the 2007 online survey, the website-www.aixinsky.com—was hacked and it took several months to update and re-establish. The advertising on this website started in early July and lasted only three weeks. Another gay website—www.jrtz.net—was used to recruit participants in stead of aixinsky.com. www.jrtz.net is a national gay website with visitors from all over China (more than 100,000 registered members).
www.yntz.net is popular in Southwest China and has at least 20,000 registered members. www.boysky.com is located in Shanghai. This website is one of the most popular gay website in China with approximately half a million registered members. Although it is national, most of its visitors are from Central and Southeast China.

![Map of China](image)

**Figure 3-1** Map of China
3.2.2 Subject inclusion and exclusion criteria

The principal population of interest in this study was visitors of the selected gay websites. To be eligible to participate, subjects met the following criteria [29, 102].

- Male living in China;
- 18 years old or over;
- Have had oral or anal intercourse with men in the past one year regardless of self identifying as being homosexual, bisexual or heterosexual.

3.2.3 Design of the study website

3.2.3.1 Contents of the study website

The study website mainly contains three web pages: the welcome screen, the informed consent form and the online questionnaire.

*Web page one: the welcome screen*

The welcome screen (*Appendix C: Figure 3-a*) contained the logo and name of the China National Center for AIDS/STD Control and Prevention (NCAIDS). Clicking on the button saying “Enter” leads respondents to the consent form.

*Web page two: the Informed Consent Form*

The webpage of the online consent form introduced the purposes of this study, criteria to participate, benefits and risks of participation and contact information of investigators (*Appendix C: Figure 3-b*). Participants were required to click the button at the end of the form saying “I agree” to indicate their consent to the online survey. We have made it clear that if a participant clicked the button, it was assumed that he had read and understood information presented in the
Chapter three: Internet-based HIV/AIDS behavioral surveys

consent form and was eligible to participate. For details about the consent form, please see Appendix D: Informed Consent Form for Online Surveys.

Web page three: the Online Questionnaire

The online questionnaire was visually and verbally similar to the one used in the community survey in Harbin (Appendix C: Figure 3-c-1 and Figure 3-c-2). Details about the online questionnaire are discussed in Section 3.2.4: Design of the online questionnaire.

3.2.3.2 Principles for design of the study website

Internet-based behavioral surveys among MSM are pioneering in China. Computer literacy and the processing power of computers vary greatly among people. Screen configurations and connection speeds may influence how people can access and respond to web surveys. In order to encourage responses and get complete and accurate answers, the following principles were considered in the design of the study website.

1. Web pages of the study website were created in the Hypertext Mark-up Language (HTML) and appeared in simplified Chinese. In order to reduce the requirement for computer equipments and shorten the time it took for participants to download and submit questionnaires, all web pages were presented in a consistent black print on a white background. Color background, complex question displays, embedded programs, sound tracks and other advanced design features which required advanced computer equipments and skills were avoided [26].

2. A pilot test was conducted to examine the functionality and readability of the
study website. The study website supported different computer platforms/operating systems (Microsoft XP, Linux and Macintosh OS) and different web browsers (Internet Explorer 6.0, Safari 1.2, Netscape 7.0 and Firefox 2.0).

3. There was no independent server for the study website. It was hosted on each of the selected gay websites. The responses were hosted in the same server and stored in an encrypted Access dataset.

4. Brief instructions were presented in the informed consent form to emphasize the ease of responding and to instruct respondents on the action needed to proceed to the next page. Specific instructions on how to take any necessary computer actions to respond to the questionnaire were provided for specific questions. As respondents might visit all three selected gay websites, they were also advised to participate only once.

5. It was difficult to ascertain a subject’s motivation for participating in the online study. Because some prospective subjects might be particularly curious about the contents of the study, or have little interest in following the stated criteria for participation, they may falsify characteristics that would exclude them. Therefore no separate screening form was used in this survey [31]. A gentle reminder was put on the consent form page to inform subjects not to participate if they were less than 18 years old, and/or had no male-male sex in the past year. Those who did not meet the study requirements could still complete the study but their data were removed in data collation and analysis process if their answers made it clear that they were not eligible.
3.2.4 Design of the online questionnaire

As mentioned above, the online questionnaire was visually and functionally similar to the questionnaire used in a community survey in Harbin (Chapter 2: 2.2.4 Design of questionnaires). Each question was presented in a conventional format similar to that normally used on a paper questionnaire except that the online questions were translated into HTML (hypertext mark-up language). Because shorter questions are better for reading on the screen, online survey questions and instructions were made briefer while maintaining a balance between brevity and a friendly tone. Respondents were not required to provide an answer to each question before moving to any subsequent questions or before submitting the questionnaire. The whole questionnaire was presented in one screen. Respondents could use a screen bar to look forward and backwards to get a sense of questionnaire length, to recheck a previous answer, or to gain a sense where they were in the questionnaire.

The questionnaire was reviewed by 6 key informants. Three were MSM and another three were health professionals from the Heilongjiang Centres for Disease Control and Prevention. The questionnaire collected information on demographic characteristics, sexual behaviors with males and females, commercial sex, and use of illegal drugs [102]. In addition, respondents were asked the frequency, reasons and place of accessing the Internet as well as sex seeking behaviors on the Internet and in traditional gay venues. These questions were based on those used in a study among gay men in Sydney and Melbourne [29]. Information on HIV/AIDS knowledge and beliefs were not collected in the online surveys to keep the questionnaire short.

The questionnaire for the 2007 online survey was refined, compared with the one in 2006. Across both rounds there were approximately 15 primary questions, about 40
sub-set questions, and 8 demographic items. The questions were ordered with
demographic characteristics followed by general sexual behaviors, sexual behaviors
on the Internet and in traditional gay venues, commercial sexual behaviors and
STD/HIV history. Coded questions used single and multiple choices, and nominal
questions. In addition there were some numeric and text-based open-ended questions.
A “Don’t Know”, “Not Applicable”, “None”, or “Other” answer was offered where
appropriate.

The results of the face-to-face surveys described in Chapter 2 show that more MSM
in China are living with a male partner [26] than in the past. Studies have indicated
that sexual partnerships play an important role in making decisions about condom
use [67, 139]. Therefore, unlike in the 2006 survey, information on sexual behavior
and condom use were collected in the 2007 online survey by distinguishing between
casual, commercial and long-term partnerships.

For details about the 2006 and 2007 online questionnaires please see:

Appendix E: HIV/AIDS behavioral surveillance surveys (BSS) among MSM
—2006 online survey

Appendix F: HIV/AIDS behavioral surveillance surveys (BSS) among MSM
—2007 online survey

3.2.5 Data collection

Between April and July in both 2006 and 2007, the study website was hosted on the
selected gay websites as mentioned above. A series of banners, pop-ups and text
notifications advertised the research project on the web pages and chat-rooms of the
selected gay websites. Clicking on a popup, a banner or the hyperlink on the text
notification took potential participants to the study website. To proceed with the
online survey, participants were asked to read the informed consent form carefully. If they were eligible and wanted to participate, they were required to click the button indicating “I agree” to indicate their consent to the survey. Participants were then presented with an online questionnaire (Appendix C: Figure 3-c-1 and Figure 3-c-2). Once participants completed the questionnaire, they were required to press the button at the end of the questionnaire saying “Submit” to submit the questionnaire. After this, the completed questionnaire was transferred to a database to create a new record along with a survey number and submission time and date.

The survey was advertised and promoted using the four main methods described below.

**A: Banners advertising and pop-ups**

A pop-up with brief information on this study was hosted on the homepage of each of the selected gay websites, and banners with a link to the study website were hosted in all chat-rooms. In order to increase the credibility and legitimacy of the study, the logo of the China National Centre for AIDS/STD Control and Prevention was posted on the banner (Appendix C: Figure 3-d, 3-e, 3-f and 3-g).

**B: Email recruitment**

Webmasters of the selected gay websites were asked to send an email to each of their registered members to invite them to take part in this research. In the email, registered members were only informed that research about HIV/AIDS was being undertaken without mentioning homosexuality in order to protect their privacy should anyone else see the email. Researchers were not able to access members’ email addresses at all for the whole research process.
C: Periodic notification

Managers of chat-rooms were asked to notify chatters periodically that a study was ongoing and encourage them to participate. A text notification with a hyperlink to the study webpage was also displayed on the chat-rooms. Clicking the hyperlink could take chatters to the online questionnaire.

D: Chatting with chatters

A group of gay volunteers with the name “NCAIDS-SURVEY” were present in chat-rooms for some days. Chatters who clicked the name were taken to the study website. At the same time the volunteer could talk to chatters who clicked their names and invite them to participate. These volunteers were not allowed to initiate a chat. However, it was found that using this method to recruit participants was time consuming and inefficient, and it was discontinued after a week’s trial.

3.2.6 Preventing repeat participation

Preventing and identifying multiple entries from the same participant was a challenge for all Internet-based surveys. Many practical reasons limited the use of IP addresses to determine multiple participations. First, the recent popularity of proxy server or network address translation (NAT) servers makes it common for one public IP address to be shared across many computers. Second, Internet cafes are an important place for Chinese MSM to access the Internet. Many computers in an Internet café may share one or several IP addresses. Third, MSM can connect to the Internet through dynamic IP addresses.

In this study, respondents were strongly advised to participate in the survey only
once. During data analyses, respondents with the same date of birth, marriage status and living in the same city were identified as duplicate submits which were excluded from final analysis [40]. No duplicates were detected in the 2006 online survey. Because a low response was achieved in the 2006 survey when asking participants to provide their date of birth, respondents were simply asked to select their age from a list provided in the 2007 survey. This change makes it difficult to use the standard described above to identify duplicate submissions. Therefore no such confirmation process was performed for the 2007 online survey.

3.2.7 Ethical issues

In this study, electronic postings including banners, popups and text notifications were posted on selected gay websites to recruit online participants. Because of word limits, these posting could only provide limited information about the study. Clicking these postings led respondents to the study website, which provided more details. After reading the detailed information, respondents would decide whether to participate in the study or not.

An email was sent out by webmasters to the registered members of the selected gay websites to invite them to participate. However, this might put recipients at risk of exposing their sexual orientation. People may check emails at work where emails are not necessarily considered private. Some potential respondents may share a computer with their family members. In order to minimize the potential privacy disclosure, registered members of the gay websites were only informed that there was a HIV research survey. If they were interested, they were invited to visit the study website for more details.

The informed consent processes described in Section 3.2.3.1 made it difficult to
Chapter three: Internet-based HIV/AIDS behavioral surveys

assess whether respondents truly understood the research. Researchers could not clarify potential misunderstandings and could not evaluate respondents’ age and mental capacity [17, 98]. So these selection criteria were addressed in the consent form. Those who were under the age of 18 and had trouble in understanding the study were advised not to participate in the surveys.

Participants might feel uncomfortable about answering sensitive questions such as those dealing with sexual behaviors, drug use or history of sexually transmitted diseases. Subjects were advised that participation was voluntary. They had the right to refuse to answer any question or to withdraw from the investigation at any time.

No personnel identification information was collected and no IP address determination was performed in this study [12, 23]. Entered electronic data were kept in an appropriate password protected computer, on a password protected network within the password protected and fire-walled computing environment of the Discipline of Public Health, at the University of Adelaide.

No monetary compensation was provided in the online survey. To do so participants would have to provide personnel identification information. Second, the cost would be prohibitive. Respondents were advised that a summary of research results would be posted on the selected gay websites.

Ethic approvals were obtained from the University of Adelaide Human Research Ethics committee and the China National Center for AIDS/STD Control and Prevention.
Chapter three: Internet-based HIV/AIDS behavioral surveys

3.2.8 Data management and analysis

3.2.8.1 Data management

Data cleaning

Submitted questionnaires were stored in an encrypted Access data set. The data set was hosted on the selected gay websites separately. When the survey was completed, web masters of the selected gay websites sent the data set to the researcher. The data set was then transferred to a Stata file. All questionnaires were readable and no data corrupted in data transmission. Stata 9.0 was used to conduct data cleaning and analysis.

Descriptive statistics and frequencies by variables and logistic checks were used to look for outliers and values that differed from expected values. Some key approaches were used as follows.

- Non applicable and blanks were recoded to missing.
- Respondents who reported an older age of first sex than reported age (19 respondents, 0.97%), the reported age at first sex was coded as missing;
- Respondents who did not answer whether having male-male sex or reported having no male-male sex in the past six months but reported having a regular, non-regular or commercial male partner in the same time period, the indicator of having male-male sex in the past six months was then coded as yes.
- Respondents were asked about the total number of male partners they had in the past six months as well as the number of regular, non-regular and commercial male partners. If this total number was less than the sum of regular, non-regular and commercial male partners, the total number was replaced by the sum of regular, non-regular and commercial male partners.
- Respondents who did not answer whether having a regular partner or reported
having no regular partner in the past six months but reported \( \geq 1 \) male regular partners in the same period of time, the indicator of whether having a regular male partner was then coded as yes.

- Respondents who did not answer whether having a non-regular male partner or reported having no non-regular male partner in the past six months but reported \( \geq 1 \) male non-regular partners in the same period of time, the indicator of whether having a non-regular male partner was coded as yes.

- Respondents who did not answer whether having a commercial male partner or reported having no commercial male partner in the past six months but reported \( \geq 1 \) male commercial partners in the same period of time, the indicator of whether having a commercial male partner was coded as yes.

**Missing data**

Missing values are a challenge for research involving human subjects. In an online survey, missing values are a more apparent challenge as interviewers are not present to clarify questions or to prompt respondents for further answers. Data could be missing for various reasons. First, men who were not homosexual or who did not meet the selection criteria could be curious about the survey, falsify information, answer several questions and submit an incomplete questionnaire. Second, men who were qualified might decide to withdraw from the study during the survey and submit uncompleted questionnaires. Third, some participants might refuse to answer some questions that they were not comfortable with. Fourth, data could be missing because of incorrect answers or difficulties in understanding the question. Researchers could not interpret confusing questions to participants because of the nature of the self-administrated online survey.

During the data management process, all submitted questionnaires were categorized into the following groups: questionnaires from individuals who do not meet selection
criteria; incomplete questionnaires; questionnaires with intentional deception; and eligible questionnaires. Participants who had no male-male sex in the past year or who were less than 18 years old were excluded from the final analysis.

Questionnaires with no-response to one third of the key questions were identified as incomplete. Questionnaires with extremely uncommon answers, such as having “55555” male sexual partners in the past six months, were judged as questionnaires with intentional deception. Numbers of participants who were excluded is presented in Section 3.3.1 Profile of samples.

After excluding the questionnaires described above, there remained a number of questionnaires with missing values. In order to understand whether participants with missing values differ from those with no missing values, demographic characteristics were compared between the two groups. Participants with no missing values to fourteen 1 or seventeen 2 key indicators from the 2006 or 2007 surveys respectively were classified as being in the group with no missing values.

As shown in Table 3.3 4, a comparison between the two groups indicates that the demographic characteristics of participants with missing values were similar to those without missing values except that those with missing values were slightly less educated and less likely to self identify as homosexual. It is assumed that these minor differences have little impact on the interpretation of the results.

### 3.2.8.2 Definition of indicators and terms

---

1 There were 14 key indicators in the 2006 survey: age at first sex, gender of first sexual partner, having sex with females/males in the past six months, having insertive/receptive anal sex with males in the past six months, number of male/female partners, condom use with males during insertive/receptive anal sex, illicit drug use, seeking sex on the internet or in traditional gay venues, and STD history.

2 Because sexual behaviors were examined according to the nature of sexual partners in the 2007 survey, a total of seventeen key questions were included.
Partnerships: A non-regular sexual partner was defined throughout as a non-spousal, non-cohabiting and non-commercial partner. Conversely, a regular sexual partner was one with whom the respondent was either married, currently living, or in a serious relationship.

UAI: Unprotected anal intercourse was defined as anal sexual contacts in which a condom was not used. The numerator for the prevalence of UAI was the number of respondents who did not always use condoms when having anal sex with male partners during the past six months. The denominator was all respondents [83].

3.2.8.3 Data analysis

Data collected in 2006 and 2007 are presented in this document separately. Univariate analysis was conducted to show the distribution of each categorical variable including demographic characteristics, risk sexual behaviors and use of gay websites. The median or mean values were calculated for numerical variables such as age and numbers of sexual partners. These variables were also categorized into groups. The percentages of respondents falling into certain categories were calculated as well.

Since the gay website-aixinsky.com and yntz.net-are located in Heilongjiang and Yunnan Province respectively, there were disproportionate respondents recruited from these two provinces. In order to assess whether participants from these two provinces were different from those living in other provinces in terms of demographic characteristics and key risk behaviors, a polytomous logistic regression was performed [36]. For each year, participants were categorized into three groups: men from Heilongjiang; men from Yunnan and men from other provinces. In the logistic model, the dependent variable was the Province where participants were
living (categorized into the three groups described above) and independent variables included demographic characteristics and key risk indicators. In the following text, men from the Heilongjiang province are referred to as HP, men from the Yunnan province as YP and men from other provinces as OP.

In order to detect whether MSM who have regular partners in the past six months are less likely to have high risk behaviors than others, bivariate analyses were performed to examine differences between men who had regular partners during the previous six months from those who did not. Chi-square tests were used to detect significant differences. A multivariate logistic regression analysis was further performed to determine the independent relationship between explanatory variables and having regular partners.

In order to determine whether risk sexual behaviors were associated with the venues where participants sought sexual partners, a polytomous logistic regression with a nominal response [10, 43] was performed as presented in Table 3.3. The 2006 and 2007 samples were merged into one data set and analyzed. Since changes were made to the 2006 survey questionnaire on questions related to numbers of partners and condom use, these indicators were combined to one indicator in order to be comparable to the 2006 survey. Participants in the 2007 sample who reported having completed a questionnaire in the 2006 survey (n = 337) were excluded in this analysis to maintain the independence of the samples. In addition, participants who did not answer questions about having sought sexual partners on the Internet or in traditional gay venues (n = 320) and those who only sought sexual partners in traditional gay venues (n = 91) were excluded as well. Overall, a total of 4,381 respondents remained in the final sample.
The remaining respondents were categorized into three categories:

- Men who sought sexual partners on the Internet only;
- Men who sought sexual partners both on the Internet and in traditional gay venues;
- Men who sought sexual partners in other ways, such as through telephone networks or personal social networks.

Multivariate models were modified through backwards elimination by removing explanatory variables with adjusted $p$ values greater than 0.10 from the model [98, 148]. In this model, the dependent variable, the approach to seeking sex partners, categorized into the three groups described above. Independent variables were those that have been shown to predict HIV risk in previous studies, including having sex with women, number of male sexual partners in the past six months, UAI during anal sex in the past six months, paying for sex and exchanging sex for money in the previous six months, and history of STDs [113, 149]. Number of male sexual partners in the past six months was analyzed as a two-level categorical variable ($< 6$ and $\geq 6$). Year of survey, age, education, marriage status, occupation and sexual orientation were among the demographic characteristics included in the data analysis [113].

To assess whether MSM living in provinces where HIV infections were mostly concentrated in drug users were more likely to use drugs than others, participants were divided into two groups and the prevalence of drug use was compared. Group A contained participants from Hunan, Guangxi, Guizhou, Sichuan, Xinjiang, Tibet, Chongqing and Yunnan Provinces. Participants from other provinces were categorized into group B.
3.3 RESULTS

3.3.1 Sample profile

From April to July in 2006, a total of 2,879 online questionnaires were submitted, of which 0.3% (9/2,879) were found with signs of intentional deception, 7.0% (210/2,879) reported having no male-male sex in the past year and 1.8% (53/2,879) were completed by respondents less than 18 years old, and 4.8% (138/2,879) were incomplete. Between April and July, 2007, a total of 3,509 men submitted online questionnaires, of which 0.3% (9/3,509) had signs of intentional deception, 17.7% did not match the selection criteria (either having no male-male sex or age less than 18 years old), and 6.3% were incomplete. In total, 2,469 men in 2006 and 2,660 in 2007 provided eligible questionnaires (Table 3.3.1).

<table>
<thead>
<tr>
<th>Sample profile</th>
<th>2006</th>
<th></th>
<th>2007</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentional deception</td>
<td>9</td>
<td>0.3</td>
<td>9</td>
<td>0.3</td>
</tr>
<tr>
<td>Less than 18 years old</td>
<td>53</td>
<td>1.8</td>
<td>49</td>
<td>1.4</td>
</tr>
<tr>
<td>Incomplete questionnaires</td>
<td>138</td>
<td>4.8</td>
<td>220</td>
<td>6.3</td>
</tr>
<tr>
<td>No male-male sex in the past year</td>
<td>210</td>
<td>7.3</td>
<td>571</td>
<td>16.3</td>
</tr>
<tr>
<td>Eligible questionnaires</td>
<td>2,469</td>
<td>85.8</td>
<td>2,660</td>
<td>75.8</td>
</tr>
<tr>
<td><strong>Total submitted</strong></td>
<td><strong>2,879</strong></td>
<td><strong>100.0</strong></td>
<td><strong>3,509</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

As shown in Table 3.3.2, participants in the two online samples were from all 31 Provinces in China. The number of participants from each province varied, with a higher proportion from Heilongjiang and Yunnan Provinces. Compared with the 2006 sample, the 2007 sample has a significant drop in the proportion of participants from Heilongjiang with approximately 24% in 2006 and only 1.7% in 2007. This is because the gay website in Heilongjiang—aixinsky.com—on which the online
survey was advertised was hacked in early March 2007. Another gay website—
www.jrtz.net with national coverage—was used to advertise the 2007 survey.

As indicated in Table 3.3 3, there are statistical differences between the HP, YP and
OP groups in the 2006 online sample in terms of demographic characteristics and
risk behaviors. Compared with the OP sample, the regression model (data not shown)
indicated that the HP group was more likely to have UAI (AOR 1.7; 95% CI 1.3-2.2)
and have sought sexual partners online (AOR 1.9; 95% 1.2-2.9), and slightly less
likely to have ever paid for sex (AOR 0.6; 95% CI 0.4-0.9); the YP group of men was
similar to the OP group except that the YP group was less educated (AOR 0.6; 95% 
CI 0.4-0.9) and more likely to have used the Internet to seek sexual partners (AOR 2.1; 95% CI 1.3-3.4). No significant differences were observed between the HP and
YN groups except that the HP group was slightly less likely to have sex with paid
sexual partners (AOR 0.6, 95% CI 0.3-1.0). Since only a small portion of participants
were recruited from the Heilongjiang in the 2007 sample, an analysis of potential
differences between the YN and OP groups was performed. Regression analysis
showed no significant differences between the two groups in terms of demographic
characteristics and risk behaviors (data not shown here).

Although there are statistical differences in several variables between the HP, YP and
OP groups, the absolute differences are not considered important from a policy
perspective (differences mostly less than 10%). Therefore, the 2006 and 2007 online
data were not analyzed by stratifying on provinces of residence.

As shown in Table 3.3 4, comparisons between participants with and without
missing values to key behavioral questions show that the two groups are similar
except participants with missing values have a lower educational level and are less
likely to self identify as homosexual. It is believed that these small absolute differences have little impact on the interpretation of the results.

### Table 3.3 2 Numbers of participants from different Provinces

<table>
<thead>
<tr>
<th>Provinces</th>
<th>2006</th>
<th>%</th>
<th>2007</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhui</td>
<td>41</td>
<td>1.7</td>
<td>42</td>
<td>1.6</td>
</tr>
<tr>
<td>Beijing</td>
<td>120</td>
<td>4.9</td>
<td>193</td>
<td>7.3</td>
</tr>
<tr>
<td>Chongqing</td>
<td>35</td>
<td>1.4</td>
<td>70</td>
<td>2.6</td>
</tr>
<tr>
<td>Fujian</td>
<td>37</td>
<td>1.5</td>
<td>45</td>
<td>1.7</td>
</tr>
<tr>
<td>Gansu</td>
<td>61</td>
<td>2.5</td>
<td>88</td>
<td>3.3</td>
</tr>
<tr>
<td>Guangdong</td>
<td>119</td>
<td>4.8</td>
<td>195</td>
<td>7.3</td>
</tr>
<tr>
<td>Guangxi</td>
<td>21</td>
<td>0.9</td>
<td>42</td>
<td>1.6</td>
</tr>
<tr>
<td>Guizhou</td>
<td>38</td>
<td>1.5</td>
<td>37</td>
<td>1.4</td>
</tr>
<tr>
<td>Hainan</td>
<td>14</td>
<td>0.6</td>
<td>35</td>
<td>1.3</td>
</tr>
<tr>
<td>Hebei</td>
<td>38</td>
<td>1.5</td>
<td>52</td>
<td>2.0</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>585</td>
<td>23.7</td>
<td>45</td>
<td>1.7</td>
</tr>
<tr>
<td>Henan</td>
<td>33</td>
<td>1.3</td>
<td>51</td>
<td>1.9</td>
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<tr>
<td>Hubei</td>
<td>63</td>
<td>2.6</td>
<td>99</td>
<td>3.7</td>
</tr>
<tr>
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<td>61</td>
<td>2.5</td>
<td>121</td>
<td>4.6</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>156</td>
<td>6.3</td>
<td>226</td>
<td>8.5</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>19</td>
<td>0.8</td>
<td>39</td>
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<tr>
<td>Jilin</td>
<td>33</td>
<td>1.3</td>
<td>34</td>
<td>1.3</td>
</tr>
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<td>Liaoning</td>
<td>55</td>
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<tr>
<td>Ningxia</td>
<td>5</td>
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<td>8</td>
<td>0.3</td>
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<td>Qinghai</td>
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<td>0.5</td>
<td>11</td>
<td>0.4</td>
</tr>
<tr>
<td>Shandong</td>
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<td>1.9</td>
<td>64</td>
<td>2.4</td>
</tr>
<tr>
<td>Shanghai</td>
<td>139</td>
<td>5.6</td>
<td>197</td>
<td>7.4</td>
</tr>
<tr>
<td>Shanxi</td>
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<td>1.0</td>
<td>33</td>
<td>1.2</td>
</tr>
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<td>74</td>
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<tr>
<td>Sichuan</td>
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<td>Tianjin</td>
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<td>0.7</td>
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<td>Xinjiang</td>
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<td>1.9</td>
</tr>
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<td>Xizang</td>
<td>6</td>
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<td>7</td>
<td>0.3</td>
</tr>
<tr>
<td>Yunnan</td>
<td>389</td>
<td>15.8</td>
<td>263</td>
<td>9.9</td>
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<td>Zhejiang</td>
<td>51</td>
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<td>93</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,469</td>
<td>100.0</td>
<td>2,660</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 3.3 3 Difference among participants from Heilongjiang, Yunnan and other Provinces

<table>
<thead>
<tr>
<th>Variables</th>
<th>2006</th>
<th></th>
<th>2007</th>
<th></th>
<th>P *</th>
<th></th>
<th>2007</th>
<th></th>
<th>P *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HP</td>
<td>YP</td>
<td>OP</td>
<td></td>
<td></td>
<td></td>
<td>HP</td>
<td>YP</td>
<td>OP</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20</td>
<td>65</td>
<td>16.0</td>
<td>43</td>
<td>13.2</td>
<td>202</td>
<td>15.8</td>
<td>18</td>
<td>6.4</td>
<td>263</td>
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<td>21-30</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>Junior high school or less</td>
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<td>9</td>
<td>2.4</td>
<td>42</td>
<td>2.9</td>
<td>11</td>
<td>4.4</td>
<td>65</td>
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<td>49</td>
<td>19.4</td>
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<td>1136</td>
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<td>193</td>
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<td>1759</td>
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<td>68</td>
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<td>373</td>
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<td>&lt; 0.001</td>
<td>207</td>
<td>84.8</td>
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<tr>
<td>Married</td>
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<td>49</td>
<td>12.7</td>
<td>207</td>
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<td>0.384</td>
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<td></td>
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<td></td>
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<tr>
<td>Homosexual</td>
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<td>254</td>
<td>67.0</td>
<td>904</td>
<td>63.5</td>
<td>170</td>
<td>66.4</td>
<td>1472</td>
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<td>Bisexual</td>
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<td>14</td>
<td>3.7</td>
<td>39</td>
<td>2.7</td>
<td>9</td>
<td>3.5</td>
<td>58</td>
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<tr>
<td>Heterosexual</td>
<td>140</td>
<td>25.5</td>
<td>82</td>
<td>21.6</td>
<td>352</td>
<td>24.7</td>
<td>60</td>
<td>23.4</td>
<td>526</td>
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<tr>
<td>Undecided</td>
<td>53</td>
<td>9.7</td>
<td>29</td>
<td>7.7</td>
<td>129</td>
<td>9.1</td>
<td>0.600</td>
<td>17</td>
<td>6.6</td>
</tr>
<tr>
<td>Having sex with a female in the past six months</td>
<td>457</td>
<td>83.1</td>
<td>323</td>
<td>86.6</td>
<td>1192</td>
<td>83.2</td>
<td>0.264</td>
<td>35</td>
<td>13.7</td>
</tr>
<tr>
<td>Having sex with a male in the past six months</td>
<td>520</td>
<td>90.0</td>
<td>333</td>
<td>86.5</td>
<td>1202</td>
<td>81.4</td>
<td>&lt; 0.001</td>
<td>19</td>
<td>7.2</td>
</tr>
<tr>
<td>UAI in the past six months</td>
<td>353</td>
<td>66.6</td>
<td>193</td>
<td>54.5</td>
<td>720</td>
<td>52.6</td>
<td>&lt; 0.001</td>
<td>86</td>
<td>41.0</td>
</tr>
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<td>Have ≥6 male partners in the past six months</td>
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<td>21.1</td>
<td>66</td>
<td>17.6</td>
<td>228</td>
<td>16.2</td>
<td>0.038</td>
<td>34</td>
<td>14.2</td>
</tr>
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<td>Sex seeking on the Internet</td>
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<td>88.8</td>
<td>340</td>
<td>88.1</td>
<td>1206</td>
<td>81.2</td>
<td>&lt; 0.001</td>
<td>236</td>
<td>90.4</td>
</tr>
<tr>
<td>Sex seeking in traditional gay venues</td>
<td>135</td>
<td>23.6</td>
<td>77</td>
<td>20.1</td>
<td>274</td>
<td>18.9</td>
<td>0.057</td>
<td>72</td>
<td>28.0</td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months</td>
<td>31</td>
<td>5.3</td>
<td>31</td>
<td>8.0</td>
<td>129</td>
<td>8.7</td>
<td>0.034</td>
<td>16</td>
<td>6.8</td>
</tr>
<tr>
<td>Exchanging money for sex in the past six months</td>
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<td>13</td>
<td>3.4</td>
<td>74</td>
<td>5.0</td>
<td>0.014</td>
<td>24</td>
<td>10.2</td>
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<tr>
<td>Illegal drug use</td>
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<td>1.6</td>
<td>3</td>
<td>0.8</td>
<td>32</td>
<td>2.2</td>
<td>0.161</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>History of STD</td>
<td>171</td>
<td>29.7</td>
<td>77</td>
<td>20.0</td>
<td>351</td>
<td>24.0</td>
<td>0.002</td>
<td>43</td>
<td>16.9</td>
</tr>
</tbody>
</table>

* Chi Square test; HP, Heilongjiang Province; YP, Yunnan Province; OP, other Provinces
Table 3.3.4 Differences in demographic characteristics between participants with missing values to key behavioral questions and participants with no missing values

<table>
<thead>
<tr>
<th>Variables</th>
<th>2006</th>
<th>2007</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td>With missing values (n = 584)</td>
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<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Age a</td>
<td>26.0 ± 5.8</td>
<td>26.4 ± 7.0</td>
<td>0.752</td>
<td>27.3 ± 6.3</td>
</tr>
<tr>
<td>Education</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior high school or less</td>
<td>48</td>
<td>2.6</td>
<td>30</td>
<td>5.4</td>
</tr>
<tr>
<td>Senior high school</td>
<td>323</td>
<td>17.7</td>
<td>132</td>
<td>23.8</td>
</tr>
<tr>
<td>College</td>
<td>1,454</td>
<td>79.7</td>
<td>392</td>
<td>70.8</td>
</tr>
<tr>
<td>Marriage</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1,615</td>
<td>86.3</td>
<td>482</td>
<td>84.1</td>
</tr>
<tr>
<td>Married</td>
<td>257</td>
<td>13.7</td>
<td>91</td>
<td>15.9</td>
</tr>
<tr>
<td>Employment</td>
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<td></td>
</tr>
<tr>
<td>Employed</td>
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<td>392</td>
<td>71.7</td>
</tr>
<tr>
<td>Unemployed</td>
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<td>155</td>
<td>28.3</td>
</tr>
<tr>
<td>Occupation</td>
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<tr>
<td>Student</td>
<td>468</td>
<td>27.7</td>
<td>146</td>
<td>28.0</td>
</tr>
<tr>
<td>Others</td>
<td>1,224</td>
<td>72.3</td>
<td>376</td>
<td>72.0</td>
</tr>
<tr>
<td>Self reported sexual orientation</td>
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<td></td>
</tr>
<tr>
<td>Homosexual</td>
<td>1,182</td>
<td>65.5</td>
<td>318</td>
<td>58.1</td>
</tr>
<tr>
<td>Other</td>
<td>623</td>
<td>34.5</td>
<td>229</td>
<td>41.9</td>
</tr>
</tbody>
</table>

a Mean ± SD; Kruskal Wallis test
b Pearson Chi square test
3.3.2 Demographic characteristics

Demographic characteristics of the two online samples are shown in Table 3.3.5. Because participants can refuse to answer or skip a question, the number of respondents answering each question varies.

**Age**

It should be noted that 18.6% (458/2,469) of respondents in 2006 did not answer the question of their age, while the non-response rate was 4.7% (125/2,660) in 2007. The difference in response to this question may reflect different methods used to collect age information. Respondents were asked to select their date of birth by clicking on a program built in the online questionnaire in 2006. In 2007 a relatively high response rate was achieved when respondents were asked to select their age.

Participants in both samples were largely between 20-30 years old. The median age was 25 years (range 18-64) in 2006 and 26 years (range 18-69) in 2007. The distribution of age of the 2006 survey similar to the 2007 sample, although the 2006 survey appears to have a higher proportion of men aged less than 20 years old and slightly lower proportion in their thirties and forties.

**Education**

Most respondents (77.6% in 2006 and 77.5% in 2007) had a relatively high level of education. The proportion with an education of junior high school or less was low (3.3% in 2006 and 3.0% in 2007).

**Marriage status and occupation**
The majority of respondents reported not being married (85.8% in 2006 and 82.9% in 2007) and most were employed at the time of survey (71.5% in 2006 and 78.1% in 2007). The 2006 sample tended to have a higher proportion of students than the 2007 sample (27.7% vs. 20.2%). This may explain the higher unemployment rate in the 2006 sample, since most students were not employed (89.2% in 2006 and 90.4% in 2007).

**Sexual orientation**

Participants were also asked to characterize their sexual orientation. Over 60% of respondents in both samples self reported themselves as homosexual and approximately a quarter identified themselves as bisexual. Less than 3% in both years self reported as heterosexual.

An association between marriage status and sexual orientation was observed (Table 3.3 6). In the both samples, participants who were married were more likely to self identify as bisexual and less likely identify as homosexual than unmarried participants. Approximately 48% of the participants who were married self reported as homosexual.
### Table 3.3.5 Demographic characteristics of MSM

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2006 (n = 2,469)</th>
<th>2007 (n = 2,660)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age, year</td>
<td></td>
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<tr>
<td>≤20</td>
<td>310</td>
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<td>282</td>
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<tr>
<td>21-30</td>
<td>1,293</td>
<td>64.3</td>
<td>1,631</td>
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<tr>
<td>31-40</td>
<td>357</td>
<td>17.8</td>
<td>515</td>
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<tr>
<td>≥41</td>
<td>51</td>
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<td>107</td>
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<tr>
<td>Total</td>
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<td>2,535</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Junior high school or less</td>
<td>78</td>
<td>3.3</td>
<td>76</td>
</tr>
<tr>
<td>Senior high school</td>
<td>455</td>
<td>19.1</td>
<td>490</td>
</tr>
<tr>
<td>College</td>
<td>1,846</td>
<td>77.6</td>
<td>1,952</td>
</tr>
<tr>
<td>Total</td>
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<td>2,518</td>
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<tr>
<td>Marital status</td>
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<td>85.8</td>
<td>2,147</td>
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<td>Married</td>
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<td>2,591</td>
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<tr>
<td>Employed</td>
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<td>2,007</td>
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<td>Occupation</td>
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<td></td>
</tr>
<tr>
<td>Student</td>
<td>614</td>
<td>27.7</td>
<td>492</td>
</tr>
<tr>
<td>Other</td>
<td>1,600</td>
<td>72.3</td>
<td>1,949</td>
</tr>
<tr>
<td>Total</td>
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<td>2,441</td>
</tr>
<tr>
<td>Self reported sexual orientation</td>
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</tr>
<tr>
<td>Homosexual</td>
<td>1,500</td>
<td>63.8</td>
<td>1,642</td>
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<tr>
<td>Bisexual</td>
<td>574</td>
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<td>586</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>67</td>
<td>2.9</td>
<td>67</td>
</tr>
<tr>
<td>Undecided</td>
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<tr>
<td>Total</td>
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<td>2,521</td>
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</tbody>
</table>

* Number of respondents answering each question varied because of missing values.

* Pearson chi square test

### Table 3.3.6 Marriage status and sexual orientation

<table>
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<tr>
<th>Sample</th>
<th>Sexual orientation</th>
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<th>Unmarried</th>
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</thead>
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<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>2006</td>
<td></td>
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</tr>
<tr>
<td>Homosexual</td>
<td>154</td>
<td>47.7</td>
<td>1,334</td>
</tr>
<tr>
<td>Bisexual</td>
<td>127</td>
<td>39.3</td>
<td>441</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>9</td>
<td>2.8</td>
<td>58</td>
</tr>
<tr>
<td>Undecided</td>
<td>33</td>
<td>10.2</td>
<td>175</td>
</tr>
<tr>
<td>2007</td>
<td></td>
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<tr>
<td>Homosexual</td>
<td>199</td>
<td>47.6</td>
<td>1,415</td>
</tr>
<tr>
<td>Bisexual</td>
<td>153</td>
<td>36.6</td>
<td>414</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>9</td>
<td>2.2</td>
<td>55</td>
</tr>
<tr>
<td>Undecided</td>
<td>57</td>
<td>13.6</td>
<td>161</td>
</tr>
</tbody>
</table>

* p < 0.001
3.3.3 Sexual risk behaviors

3.3.3.1 First sexual experience

Over half the participants had their first sexual experience between the age of 15 and 20 years old (56.4% in 2006 and 53.8% in 2007). The median age was 19 years in both 2006 and 2007. Approximately 11% had first sex before the age of 14 years old in 2006 and the rate was 9.0% in 2007. Most respondents (84.4% in 2006 and 83.2% in 2007) had first sex with males. (Table 3.3 7)

3.3.3.2 Having sex with females and males

Most respondents (84.3% in 2006 and 89.3% in 2007) reported having had oral or anal sex with males in the past six months, of whom the median number of male sex partners was three with two thirds (66.5%) having multiple sexual partners (≥ 2) in 2006, and the median number was two in 2007 with 62.3% having multiple male partners. (Table 3.3 7)

Approximately 17% (16.3% in 2006 and 17.3% in 2007) reported having had sex with females in the past six months. Of these men, approximately 20% reported having more than one female partner. No differences were observed between the two years. There was a significant relationship between marriage status and having sex with females. Those who were married were more likely to have sex with females in the past six months than the unmarried (61.8% vs. 8.7% in 2006, p < 0.001; 47.4% vs. 11.0% in 2007, p < 0.001). When having sex with females, no significant difference in condom use consistency between two years was observed. Less than 30% reported always using condoms and around one third reported never using a condom. (Table 3.3 7)
### Table 3.3 7 Selected characteristics of MSM

<table>
<thead>
<tr>
<th>Variables</th>
<th>2006 (n = 2,469)</th>
<th>2007 (n = 2,660)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Age at first sex</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>≤14</td>
<td>255</td>
<td>11.2</td>
<td>226</td>
</tr>
<tr>
<td>15-20</td>
<td>1,290</td>
<td>56.4</td>
<td>1,345</td>
</tr>
<tr>
<td>≥21</td>
<td>741</td>
<td>32.4</td>
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</tr>
<tr>
<td>Total</td>
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<td></td>
<td>2,502</td>
</tr>
<tr>
<td>Gender of first sexual partner</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,999</td>
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</tr>
<tr>
<td>Female</td>
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<td>2,608</td>
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<td></td>
</tr>
<tr>
<td>Number of female sexual partners in the past six months</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>62.7</td>
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</tr>
<tr>
<td>≥2</td>
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<td>93</td>
</tr>
<tr>
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<td>105</td>
</tr>
<tr>
<td>Total</td>
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<td>446</td>
</tr>
<tr>
<td>Condom use with females</td>
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</tr>
<tr>
<td>Never</td>
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<td>30.6</td>
<td>117</td>
</tr>
<tr>
<td>Sometimes</td>
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<td>41.7</td>
<td>119</td>
</tr>
<tr>
<td>Always</td>
<td>89</td>
<td>27.7</td>
<td>105</td>
</tr>
<tr>
<td>Having sex with men in the past six months</td>
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<td></td>
</tr>
<tr>
<td>Number of male sexual partners in the past six months</td>
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</tr>
<tr>
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</tr>
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<td>2-5</td>
<td>955</td>
<td>46.5</td>
<td>1,095</td>
</tr>
<tr>
<td>6-10</td>
<td>266</td>
<td>12.9</td>
<td>248</td>
</tr>
<tr>
<td>≥11</td>
<td>145</td>
<td>7.1</td>
<td>137</td>
</tr>
<tr>
<td>No response</td>
<td>106</td>
<td>5.2</td>
<td>213</td>
</tr>
<tr>
<td>Total</td>
<td>2,055</td>
<td></td>
<td>2,356</td>
</tr>
</tbody>
</table>
Chapter three: Internet-based HIV/AIDS behavioral surveys

3.3.4 Unprotected anal intercourse (UAI)

As has been discussed previously, data on sexual behaviors collected in 2006 did not distinguish between regular and non-regular partners, while these were studied in the 2007 survey. Therefore, results regarding UAI behaviors of the two samples are presented separately as follows.

3.3.4.1 UAI among the 2006 sample

Univariate analysis of UAI behaviors of the 2006 sample is presented in Table 3.3 8. Participants were asked whether they had always used condoms in the past six months during insertive and receptive anal sex. For men who had insertive anal sex in the past six months, 26.0% reported never using, and 29.5% reported always using a condom. For those who had receptive anal sex in the past six months, the rates were 28.6% and 29.9%, respectively. In total, only 43.4% of all participants showed little or no risk for HIV transmission. These men had either had no anal intercourse (27.4%) or had always used condoms for anal intercourse (16.1%). Over half (56.6%) reported UAI in the past six months.

Among participants who had anal sex with males in the past six months, over half (52.2%) had both insertive and receptive anal sex, while 23.4% reported playing the insertive role only and 11.5% had receptive sex only.

3.3.4.2 UAI among the 2007 sample

In the 2007 online survey, participants were asked if they had sex with males in the past six months, and then were asked about sexual behaviors by partnerships. The type of partners was described as followed.
Chapter three: Internet-based HIV/AIDS behavioral surveys

- **Regular partner**: a partner with whom the respondent was either married, or currently living, or in a serious relationship.
- **Non-Regular partner**: a partner with whom the participant was in a non-spousal, non-cohabiting and non-commercial partner relationship.
- **Male sex worker**: a partner whom the respondent paid money in exchange for sex services.
- **Male client**: a partner who paid the respondent in exchange for sex services.

### 3.3.4.2.1 UAI with regular and non-regular partners

Among those who had male sexual partners in the past six months in the 2007 sample, 55.3% (1,265/2,287) reported having regular partners, of whom 23.2% had more than one regular partner. The median number of regular partners in the six months before the interview was one (range 1-20). Condom use during anal sex with regular partners in the past six months is presented in Table 3.3. Approximately 33.9% reported never using a condom when having anal sex with regular partners and 24.2% reported always using condoms.

Among those who had male sexual partners in the past six months, about two thirds (61.1%) reported having non-regular partners, with 25.1% having two partners and over a half of them having more than three. The median number of non-regular partners in the past six months was three (range 1-134, mean 5.8). When having sex with non-regular partners, 19.6% reported never using a condom and 42.1% reported always using condoms.

There was significant difference in condom use during anal sex with regular and non-regular partners. Participants were less likely to never use a condom when having anal sex with non-regular partners than having anal sex with regular partners (19.6% vs. 33.9%), and more likely to always use condoms (42.1% vs. 24.0%). (Table 3.3)
3.3.4.2.2 UAI with commercial partners

There are two different situations for commercial sex behaviors among MSM: exchanging sex for money and exchanging money for sex. Among the participants who had male-male sex in the past six months, 12.4% reported having had sex with paid sexual partners. Meanwhile, 6.8% reported having had sex in exchange for money.

The prevalence of consistent condom use with commercial partners was significantly higher than with regular and non-regular partners. Among those who had anal sex with paid partners in the past six months, 65.0% reported always using a condom and 16.9% never used a condom; among those who had anal sex with clients, 45.7% always used condoms and 26.0% never used a condom. (Table 3.3 9)

3.3.4.2.3 Factors associated with having regular partners

It is assumed that having UAI with regular partners may present little or no risk of HIV transmission if MSM always use condoms when having sex with non-regular or commercial partners. As shown in Table 3.3 10, however, among those who had regular partners during the past six months, 38.5% also had non-regular partners at the same time and less than half (45.6%) consistently used condoms when having anal sex with non-regular partners. Additionally, 9.5% also had sex with paid partners and 5.1% had sex with clients in exchange for money. The prevalence of consistent condom use in both situations was low (63.3% with paid partners and 53.3% with paying partners).

Table 3.3 10 shows that there are significant differences in demographic characteristics and risk behaviors between MSM who have regular partners during
the past six months and those who do not. Men having regular partners appear to have a higher education level and are less likely to be employed. In the multivariate analysis (Table 3.3), after adjusting for educational level and employment status, men having regular partners are less likely to have sex with females (AOR 0.61, 95% CI 0.45-0.83, p = 0.002), have multiple sexual partners in the past six months (AOR 0.57, 95% CI 0.40-0.80, p = 0.001), have non-regular partners (AOR 0.06, 95% CI 0.04-0.08, p < 0.001) and are less likely to have sex with paid (AOR 0.41, 95% CI 0.28-0.59, p < 0.001) or paying partners (AOR 0.60, 95% CI 0.36-0.99, p = 0.045).

Figure 3-2 Condom use during anal sex by types of sexual partners, 2007 online MSM sample
### Table 3.3 8 Unprotected anal intercourse, 2006 online sample

<table>
<thead>
<tr>
<th>Sexual behaviors (No. responding)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having male-male sex in the past six months (n = 2,439)</td>
<td>2,055</td>
<td>84.3</td>
</tr>
<tr>
<td>Preferred anal sexual behavior (n = 1,922)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insertive anal sex only</td>
<td>450</td>
<td>23.4</td>
</tr>
<tr>
<td>Receptive anal sex only</td>
<td>221</td>
<td>11.5</td>
</tr>
<tr>
<td>Both insertive and receptive</td>
<td>1,004</td>
<td>52.2</td>
</tr>
<tr>
<td>No anal sex in the past six months</td>
<td>247</td>
<td>12.9</td>
</tr>
<tr>
<td>Condom use during the insertive anal intercourse with men in the past six months (n = 1,375)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>357</td>
<td>26.0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>612</td>
<td>44.5</td>
</tr>
<tr>
<td>Always</td>
<td>406</td>
<td>29.5</td>
</tr>
<tr>
<td>Condom use during the receptive anal intercourse with men in the past six months (n = 1,274)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>364</td>
<td>28.6</td>
</tr>
<tr>
<td>Sometimes</td>
<td>529</td>
<td>41.9</td>
</tr>
<tr>
<td>Always</td>
<td>381</td>
<td>29.9</td>
</tr>
<tr>
<td>Condom use during anal intercourse including both insertive and receptive in the past six months among all participants (n = 2,254)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>316</td>
<td>14.0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>950</td>
<td>42.2</td>
</tr>
<tr>
<td>Always</td>
<td>357</td>
<td>15.8</td>
</tr>
<tr>
<td>No anal sex</td>
<td>631</td>
<td>28.0</td>
</tr>
</tbody>
</table>

* Number of respondents answering each question varied because of missing values.
Table 3.3 9 Unprotected anal intercourse by types of sexual partners, 2007 online sample

<table>
<thead>
<tr>
<th>Variables (no. of responding)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having male-male sex in the past six months (n = 2,637)</td>
<td>2,356</td>
<td>89.3</td>
</tr>
<tr>
<td>Having regular partners (n = 2,284)</td>
<td>1,265</td>
<td>55.3</td>
</tr>
<tr>
<td>Number of regular partners (n = 1,209)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>929</td>
<td>76.8</td>
</tr>
<tr>
<td>2</td>
<td>182</td>
<td>15.1</td>
</tr>
<tr>
<td>≥3</td>
<td>98</td>
<td>8.1</td>
</tr>
<tr>
<td>Condom use during anal intercourse with regular partners (n = 1,030)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>349</td>
<td>33.9</td>
</tr>
<tr>
<td>Sometimes</td>
<td>432</td>
<td>41.9</td>
</tr>
<tr>
<td>Always</td>
<td>249</td>
<td>24.2</td>
</tr>
<tr>
<td>Having non-regular partners (n = 2,257)</td>
<td>1,379</td>
<td>61.1</td>
</tr>
<tr>
<td>Number of non-regular partners (n = 1,289)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>171</td>
<td>13.3</td>
</tr>
<tr>
<td>2</td>
<td>325</td>
<td>25.2</td>
</tr>
<tr>
<td>3-5</td>
<td>500</td>
<td>38.8</td>
</tr>
<tr>
<td>≥6</td>
<td>293</td>
<td>22.7</td>
</tr>
<tr>
<td>Condom use during anal intercourse with non-regular partners (n = 1,092)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>214</td>
<td>19.6</td>
</tr>
<tr>
<td>Sometimes</td>
<td>408</td>
<td>38.3</td>
</tr>
<tr>
<td>Always</td>
<td>460</td>
<td>42.1</td>
</tr>
<tr>
<td>Paying for sex in the past six months (n = 2,238)</td>
<td>278</td>
<td>12.4</td>
</tr>
<tr>
<td>Condom use during anal intercourse with paid partners (n = 254)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>43</td>
<td>16.9</td>
</tr>
<tr>
<td>Sometimes</td>
<td>46</td>
<td>18.1</td>
</tr>
<tr>
<td>Always</td>
<td>165</td>
<td>65.0</td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months (n = 2,251)</td>
<td>154</td>
<td>6.8</td>
</tr>
<tr>
<td>Condom use during anal intercourse with clients (n = 127)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>33</td>
<td>26.0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>36</td>
<td>28.3</td>
</tr>
<tr>
<td>Always</td>
<td>58</td>
<td>45.7</td>
</tr>
</tbody>
</table>

*Number of respondents answering each question varied.
## Table 3.3 10 Differences between MSM who have regular partners and those who do not, 2007 online sample

<table>
<thead>
<tr>
<th>Variables</th>
<th>Having regular partners in the past six months</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n = 1,265)</td>
<td>No (n = 1,022)</td>
<td>P *</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>127</td>
<td>10.5</td>
<td>88</td>
</tr>
<tr>
<td>21-30</td>
<td>775</td>
<td>64.2</td>
<td>637</td>
</tr>
<tr>
<td>31-40</td>
<td>251</td>
<td>20.8</td>
<td>216</td>
</tr>
<tr>
<td>≥ 41</td>
<td>54</td>
<td>4.5</td>
<td>37</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior high school or less</td>
<td>25</td>
<td>2.1</td>
<td>37</td>
</tr>
<tr>
<td>High school</td>
<td>209</td>
<td>17.5</td>
<td>208</td>
</tr>
<tr>
<td>College</td>
<td>963</td>
<td>80.5</td>
<td>735</td>
</tr>
<tr>
<td>Employed</td>
<td>953</td>
<td>77.2</td>
<td>809</td>
</tr>
<tr>
<td>Married</td>
<td>1,040</td>
<td>83.9</td>
<td>804</td>
</tr>
<tr>
<td>Student</td>
<td>159</td>
<td>17.0</td>
<td>229</td>
</tr>
<tr>
<td><strong>Self identified sexual orientation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homosexual</td>
<td>819</td>
<td>67.5</td>
<td>632</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>27</td>
<td>2.2</td>
<td>25</td>
</tr>
<tr>
<td>Bisexual</td>
<td>276</td>
<td>22.8</td>
<td>227</td>
</tr>
<tr>
<td>Undecided</td>
<td>91</td>
<td>7.5</td>
<td>86</td>
</tr>
<tr>
<td><strong>Having sex with women in the past 6 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of male sex partners in the past 6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1</td>
<td>549</td>
<td>45.9</td>
<td>98</td>
</tr>
<tr>
<td>2-5</td>
<td>507</td>
<td>42.4</td>
<td>574</td>
</tr>
<tr>
<td>6-10</td>
<td>91</td>
<td>7.6</td>
<td>156</td>
</tr>
<tr>
<td>≥11</td>
<td>50</td>
<td>4.2</td>
<td>84</td>
</tr>
<tr>
<td><strong>Having sex with non-regular partners</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>91</td>
<td>20.0</td>
<td>123</td>
</tr>
<tr>
<td>Sometimes</td>
<td>157</td>
<td>34.4</td>
<td>260</td>
</tr>
<tr>
<td>Always</td>
<td>208</td>
<td>45.6</td>
<td>250</td>
</tr>
<tr>
<td><strong>Having sex with paid partners</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>99</td>
<td>8.0</td>
<td>178</td>
</tr>
<tr>
<td>Sometimes</td>
<td>14</td>
<td>15.6</td>
<td>32</td>
</tr>
<tr>
<td>Always</td>
<td>57</td>
<td>63.3</td>
<td>108</td>
</tr>
<tr>
<td><strong>Having sex with clients in exchange for money</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>52</td>
<td>4.2</td>
<td>94</td>
</tr>
<tr>
<td>Sometimes</td>
<td>13</td>
<td>28.9</td>
<td>20</td>
</tr>
<tr>
<td>Always</td>
<td>8</td>
<td>17.8</td>
<td>27</td>
</tr>
</tbody>
</table>

* Pearson Chi square test

Note: Participants who did not have male-male sex in the past six months were excluded (n = 281)
### Table 3.3 11 Differences between men who have regular partners and those who do not, 2007 online sample: A logistic analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Having regular partners in the past six months (n = 1,878)*</th>
<th>OR</th>
<th>95% CI</th>
<th>AOR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having sex with females in the past six months</td>
<td></td>
<td>0.64</td>
<td>0.51, 0.80</td>
<td>0.61</td>
<td>0.45, 0.83</td>
</tr>
<tr>
<td>Having multiple male sexual partners in the past six months</td>
<td></td>
<td>0.14</td>
<td>0.11, 0.18</td>
<td>0.57</td>
<td>0.40, 0.80</td>
</tr>
<tr>
<td>Having non-regular partners in the past six months</td>
<td></td>
<td>0.08</td>
<td>0.06, 0.10</td>
<td>0.06</td>
<td>0.04, 0.08</td>
</tr>
<tr>
<td>Having sex with paid sexual partners in the past six months</td>
<td></td>
<td>0.40</td>
<td>0.31, 0.52</td>
<td>0.41</td>
<td>0.28, 0.60</td>
</tr>
<tr>
<td>Having sex with clients in exchange for money in the past six months</td>
<td></td>
<td>0.42</td>
<td>0.30, 0.60</td>
<td>0.60</td>
<td>0.36, 0.99</td>
</tr>
</tbody>
</table>

*Adjusted for education level and employment status
Note: Participants who did not have male-male sex in the past six months were excluded (n = 281).

### 3.3.4.2.4 Reasons for not using condoms during anal sex

Respondents were asked why they were not consistently using condoms when having anal sex with different types of sexual partners. As indicated in Table 3.3 12, the most common reason for not using condoms when having anal sex with regular partners was that respondents believed they were in a mutually faithful sexual relationship (55.4%). In addition, 34.2% answered that they did not like using condoms and 27.9% reported that it was because their partners did not like using condoms. When having anal sex with non-regular partners, the major reasons were non-availability of condoms (45.0%) and that the sexual encounter occurred in the heat of the moment (32.6%). When having sex with partners in exchange for money, 48.9% reported the reason for not using condoms was because they did not like them. In total, availability of condoms, and dissatisfaction with condoms as well as partners’ objections to condom use played important roles in condom use with different types of sexual partners. Few participants reported that quality and costs of condoms were the reason for not using them.
Table 3.3 12 Reasons for not using condoms during anal sex by types of sexual partners, 2007 online sample

<table>
<thead>
<tr>
<th>Reasons (yes)</th>
<th>With regular partners (n = 792)</th>
<th>With non-regular partners (n = 629)</th>
<th>With paid partners (n = 92)</th>
<th>With clients (n = 78)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>You did not like using condoms.</td>
<td>271</td>
<td>34.2</td>
<td>199</td>
<td>31.6</td>
</tr>
<tr>
<td>Your partners did not like using condoms</td>
<td>221</td>
<td>27.9</td>
<td>106</td>
<td>16.9</td>
</tr>
<tr>
<td>No condom was available when you were having sex.</td>
<td>193</td>
<td>24.4</td>
<td>283</td>
<td>45.0</td>
</tr>
<tr>
<td>The quality of the condom was bad; it often slipped or broke during sex.</td>
<td>27</td>
<td>3.4</td>
<td>18</td>
<td>2.9</td>
</tr>
<tr>
<td>You couldn’t afford to buy enough condoms to use every time when having sex.</td>
<td>35</td>
<td>4.4</td>
<td>26</td>
<td>4.1</td>
</tr>
<tr>
<td>You didn’t think you could catch the AIDS virus or pass the virus on to others.</td>
<td>140</td>
<td>17.7</td>
<td>22</td>
<td>3.5</td>
</tr>
<tr>
<td>You were in a mutually faithful sexual relationship.</td>
<td>439</td>
<td>55.4</td>
<td>146</td>
<td>23.2</td>
</tr>
<tr>
<td>You were in the heat of the moment.</td>
<td>172</td>
<td>21.7</td>
<td>205</td>
<td>32.6</td>
</tr>
<tr>
<td>You were too drunk.</td>
<td>25</td>
<td>3.2</td>
<td>42</td>
<td>6.7</td>
</tr>
<tr>
<td>Others</td>
<td>42</td>
<td>5.3</td>
<td>40</td>
<td>6.4</td>
</tr>
</tbody>
</table>
3.3.5 Sex seeking on the gay website

Sex seeking behaviors among MSM recruited in 2006 and 2007 are presented in Table 3.3 14.

Use of gay websites

When participants were asked what they were looking for when using the gay websites, similar results were obtained from the both 2006 and 2007 samples (Figure 3- 3). The most common response was “casual looking” (54.7% in 2006 and 59.3% in 2007). Approximate half said they were looking for casual sex partners (51.6% in 2006 and 47.6% in 2007). Over 40% reported they were looking for a possible stable relationship. Nearly one in three also reported that they were using the gay website to look for general health information. Only a small proportion (15.8% in 2006 and 16.3% in 2007) reported they were looking for “Cyber sex”. Other uses included chatting with others and looking for pornographic photographs or videos.

Access to gay websites

Participants accessed gay websites from a variety of locations, but most commonly from their own homes (50.9% in 2006 and 55.7% in 2007) and Internet cafes (38.6% in 2006 and 32.6% in 2007). Only a small proportion (fewer than 9% in both years) mainly accessed gay websites from work and fewer than 3% accessed the Internet from other cites. (Figure 3- 4)

Participants were also asked to estimate their frequency of visiting gay websites. Approximately a quarter in both years (25.3% in 2006 and 24.8% in 2007) visited
gay websites at least once a day and nearly half (45.2% in 2006 and 43.9% in 2007) did so several times a week.

**Sex seeking on the Internet**

Although only about half of the participants reported that their main purpose for visiting gay websites was to look for sexual partners, the majority in both study years (86.1% (2,063/2,395) in 2006; 84.3% (2,085/2,472) in 2007) had successfully used the Internet to seek sexual partners.

The number of partners met on the Internet during the past six months was similar in both samples. Among those who ever met sexual partners on the Internet, the median number was two for both years (25%-75% percentiles, 0-5). About 20% (21.3% in 2006 and 18.0% in 2007) reported having met more than six male partners via the Internet in the previous six months.

**Reasons for seeking sex on the Internet**

Participants were asked their reasons for using the Internet to seek sexual partners. The most common reasons in both samples were that the Internet seemed to be an easy and convenient way to cruise (61.1% in 2006 and 62.1% in 2007) and that it was a good way to know more people (44.0% in 2006 and 44.4% in 2007). Less than 15% reported that it was because the Internet was supposed to be a safe way to cruise. It was also interesting to note that nearly 40% of the men reported being tired of cruising in traditional gay venues before switching to the Internet.
3.3.6 Sex seeking in traditional gay venues

Approximately half the participants in both years also visited traditional gay venues (47.5% in 2006 and 52.2% in 2007). Of these, most (77.7% in 2006 and 77.3% in 2007) visited such venues less than once a month while less than half of them (42.3% in 2006 and 48.2% in 2007) had sought sexual partners there. The median number of sexual partners met in traditional gay venues for both years was two (25%-75% percentiles, 0-4). (Table 3.3 14)
Chapter three: Internet-based HIV/AIDS behavioral surveys

Figure 3-3 What MSM are seeking on gay websites, by year of survey
Note: These categories are not mutually exclusive.

Figure 3-4 Where MSM are accessing the Internet, by year of survey
Table 3.3 13 Sex seeking behavior on the Internet

<table>
<thead>
<tr>
<th>Online behaviors</th>
<th>2006 (n = 2,410)</th>
<th></th>
<th>2007 (n = 2,501)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Uses of the Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just looking/surfing</td>
<td>1,266</td>
<td>54.7</td>
<td>1,457</td>
<td>59.3</td>
</tr>
<tr>
<td>Meet men for casual sex</td>
<td>1,194</td>
<td>51.6</td>
<td>1,168</td>
<td>47.6</td>
</tr>
<tr>
<td>Meet men for a possible stable relationship</td>
<td>1,036</td>
<td>44.7</td>
<td>1,000</td>
<td>40.7</td>
</tr>
<tr>
<td>Looking for health information</td>
<td>787</td>
<td>34.0</td>
<td>795</td>
<td>32.4</td>
</tr>
<tr>
<td>Online sex (cybersex)</td>
<td>365</td>
<td>15.8</td>
<td>399</td>
<td>16.3</td>
</tr>
<tr>
<td>Meet with friends regularly</td>
<td>205</td>
<td>8.9</td>
<td>177</td>
<td>7.2</td>
</tr>
<tr>
<td>Others</td>
<td>201</td>
<td>8.7</td>
<td>212</td>
<td>8.6</td>
</tr>
<tr>
<td>Accessing gay websites</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At home</td>
<td>1,196</td>
<td>50.9</td>
<td>1,349</td>
<td>55.7</td>
</tr>
<tr>
<td>Internet Café</td>
<td>907</td>
<td>38.6</td>
<td>789</td>
<td>32.6</td>
</tr>
<tr>
<td>At work</td>
<td>181</td>
<td>7.7</td>
<td>214</td>
<td>8.8</td>
</tr>
<tr>
<td>In other cities</td>
<td>66</td>
<td>2.8</td>
<td>68</td>
<td>2.9</td>
</tr>
<tr>
<td>Frequency of visiting gay websites</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyday</td>
<td>590</td>
<td>25.3</td>
<td>598</td>
<td>24.8</td>
</tr>
<tr>
<td>Several times a week</td>
<td>1,055</td>
<td>45.2</td>
<td>1,056</td>
<td>43.9</td>
</tr>
<tr>
<td>Once a week</td>
<td>268</td>
<td>11.5</td>
<td>302</td>
<td>12.5</td>
</tr>
<tr>
<td>less than once a week</td>
<td>265</td>
<td>11.4</td>
<td>272</td>
<td>11.3</td>
</tr>
<tr>
<td>less than once a month</td>
<td>156</td>
<td>6.7</td>
<td>180</td>
<td>7.5</td>
</tr>
<tr>
<td>Seeking sex on the Internet</td>
<td>2,063</td>
<td>86.1</td>
<td>2,085</td>
<td>84.3</td>
</tr>
<tr>
<td>Number of sexual partners met through the Internet in the past six months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>231</td>
<td>13.3</td>
<td>329</td>
<td>18.2</td>
</tr>
<tr>
<td>1</td>
<td>371</td>
<td>21.4</td>
<td>369</td>
<td>20.4</td>
</tr>
<tr>
<td>2-5</td>
<td>762</td>
<td>43.9</td>
<td>783</td>
<td>43.4</td>
</tr>
<tr>
<td>6-10</td>
<td>238</td>
<td>13.7</td>
<td>212</td>
<td>11.8</td>
</tr>
<tr>
<td>≥11</td>
<td>132</td>
<td>7.6</td>
<td>112</td>
<td>6.2</td>
</tr>
<tr>
<td>Reasons for using gay websites to look for sexual partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends were doing/talking about it</td>
<td>183</td>
<td>8.9</td>
<td>215</td>
<td>10.6</td>
</tr>
<tr>
<td>A safe way to cruise</td>
<td>303</td>
<td>14.7</td>
<td>287</td>
<td>14.1</td>
</tr>
<tr>
<td>An easy and convenient way to cruise</td>
<td>1,261</td>
<td>61.1</td>
<td>1,258</td>
<td>62.1</td>
</tr>
<tr>
<td>Good way to know more people</td>
<td>908</td>
<td>44.0</td>
<td>900</td>
<td>44.4</td>
</tr>
<tr>
<td>Good and easy way to find more sexual partners</td>
<td>520</td>
<td>25.2</td>
<td>500</td>
<td>24.7</td>
</tr>
<tr>
<td>Tired of traditional gay venues(bars, public bathhouses, et al)</td>
<td>799</td>
<td>38.7</td>
<td>837</td>
<td>41.3</td>
</tr>
<tr>
<td>Other reasons</td>
<td>82</td>
<td>4.0</td>
<td>75</td>
<td>3.7</td>
</tr>
</tbody>
</table>
### Table 3.3 Sex seeking behavior in traditional gay venues

<table>
<thead>
<tr>
<th>Variables</th>
<th>2006 (n = 2,449)</th>
<th>2007 (n = 2,529)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit traditional gay venues</td>
<td>1,162 47.5</td>
<td>1,319 52.2</td>
</tr>
<tr>
<td>Frequency of visiting traditional gay venues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyday</td>
<td>7 0.6</td>
<td>15 1.2</td>
</tr>
<tr>
<td>Several times a week</td>
<td>40 3.5</td>
<td>49 4.0</td>
</tr>
<tr>
<td>Once a week</td>
<td>94 8.3</td>
<td>108 8.9</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>111 9.8</td>
<td>105 8.6</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>877 77.7</td>
<td>943 77.3</td>
</tr>
<tr>
<td>Sex seeking in traditional gay venues</td>
<td>486 42.3</td>
<td>618 48.2</td>
</tr>
<tr>
<td>Number of sexual partners met through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>traditional gay venues in the past six months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>113 26.7</td>
<td>143 28.3</td>
</tr>
<tr>
<td>1</td>
<td>98 23.1</td>
<td>113 22.3</td>
</tr>
<tr>
<td>2-5</td>
<td>147 34.7</td>
<td>165 32.6</td>
</tr>
<tr>
<td>≥6</td>
<td>66 15.6</td>
<td>85 16.8</td>
</tr>
</tbody>
</table>

### 3.3.7 Risk sexual behaviors by places of seeking sexual partners

In order to determine whether MSM who seek partners in different venues show any difference in risk behaviors, bivariate and multivariate analyses were performed. As presented in Table 3.3, there are significant differences in demographic characteristics and risk behaviors across the three groups: men seeking sexual partners i) both in traditional gay venues and on the Internet, ii) on the Internet only (comparison group) and iii) in other ways (such as through personal networks).

Participants who sought sexual partners both on the Internet and in traditional gay venues had a higher proportion of the following characteristics: aged over 30, married, having sex with females, more than six sexual partners, UAI in the past six
months, commercial sexual behaviors in the previous six months and a history of STD, and a lower proportion of being students.

A polytomous logistic regression was further performed to determine the factors associated with meeting partners in different venues. The results of the logistic model are presented in Table 3.3 15. Using the group who sought sexual partners on the Internet only as the comparison group, men seeking sexual partners both in traditional gay venues and on the Internet were significantly older (OR 1.8, 95% CI 1.4-2.3), less likely to be a student (OR 0.5, 95% CI 0.4-0.7), nearly three times more likely to have over six male partners in the past six months (OR 3.1, 95% CI 2.4-3.9), more likely to have a history of STDs (OR 1.5, 95% CI 1.2-1.8) and more likely to have commercial sex behaviors including buying and selling sex. No significant differences were observed in the prevalence of UAI between the two groups.

No demographic differences were identified between the groups of men who sought sex on the Internet only and those in other ways, except that men seeking sex in other ways were less likely to identify themselves as homosexual (OR 0.6, 95% CI 0.4-0.8). In terms of risky sexual behaviors, the group of men seeking sex in other ways was significantly less likely to have more than six sexual partners (OR 0.2, 95% CI 0.1-0.5), UAI (OR 0.6, 95% CI 0.4-0.8) and a STD history (OR 0.4, 95% CI 0.2-0.5). (Table 3.3 15)
### Table 3.3 Differences in risk behaviors by the venues of sex seeking: Polytomous logistic regression analysis

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Both on the Internet and in traditional gay venues (n = 911)</th>
<th>On the Internet only (n = 2,885)</th>
<th>In other ways (n = 585)</th>
<th>Both on the Internet and in traditional gay venues vs. On the Internet only</th>
<th>In other ways vs. On the Internet only</th>
<th>Both on the Internet and in traditional gay venues vs. In other ways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of survey (2007)</td>
<td>467 51.2</td>
<td>1,321 45.8</td>
<td>291 49.7</td>
<td>1.4 0.004 1.1, 1.7</td>
<td>1.1 0.642 0.8, 1.4</td>
<td>1.3 0.145 0.9, 1.8</td>
</tr>
<tr>
<td>Age (≥ 31 years old)</td>
<td>275 34.4</td>
<td>490 19.2</td>
<td>102 19.6</td>
<td>1.8 0.000 1.4, 2.3</td>
<td>1.1 0.635 0.7, 1.7</td>
<td>1.6 0.037 1.0, 2.5</td>
</tr>
<tr>
<td>Education (college)</td>
<td>666 76.1</td>
<td>2,229 80.0</td>
<td>440 79.6</td>
<td>0.8 0.147 0.6, 1.1</td>
<td>1.1 0.701 0.8, 1.5</td>
<td>0.8 0.206 0.5, 1.2</td>
</tr>
<tr>
<td>Married</td>
<td>181 20.2</td>
<td>390 13.6</td>
<td>79 13.8</td>
<td>0.9 0.627 0.7, 1.3</td>
<td>0.9 0.659 0.5, 1.5</td>
<td>1.0 0.930 0.6, 1.8</td>
</tr>
<tr>
<td>Occupation (student)</td>
<td>96 11.4</td>
<td>701 26.7</td>
<td>184 35.3</td>
<td>0.5 0.000 0.4, 0.7</td>
<td>1.3 0.058 1.0, 1.8</td>
<td>0.4 0.000 0.2, 0.5</td>
</tr>
<tr>
<td>Self identified as homosexual</td>
<td>579 66.7</td>
<td>1,865 67.3</td>
<td>288 52.1</td>
<td>1.0 0.769 0.8, 1.3</td>
<td>0.6 0.000 0.4, 0.8</td>
<td>1.8 0.001 1.3, 2.6</td>
</tr>
<tr>
<td>Having sex with women</td>
<td>190 21.6</td>
<td>394 14.1</td>
<td>93 16.5</td>
<td>1.4 0.059 1.0, 1.9</td>
<td>1.0 0.966 0.6, 1.6</td>
<td>1.4 0.219 0.8, 2.3</td>
</tr>
<tr>
<td>6male sexual partners in the past six months</td>
<td>322 38.3</td>
<td>353 12.9</td>
<td>12 2.2</td>
<td>3.1 0.000 2.4, 3.9</td>
<td>0.2 0.000 0.1, 0.5</td>
<td>13.5 0.000 6.1, 29.7</td>
</tr>
<tr>
<td>UAI during the past six months</td>
<td>547 66.8</td>
<td>1,424 57.4</td>
<td>184 39.3</td>
<td>1.2 0.114 1.0, 1.5</td>
<td>0.6 0.000 0.4, 0.8</td>
<td>2.1 0.000 1.5, 2.9</td>
</tr>
<tr>
<td>Paying for sex in the past six months</td>
<td>175 19.8</td>
<td>190 7.0</td>
<td>19 3.7</td>
<td>1.7 0.002 1.2, 2.3</td>
<td>0.6 0.251 0.3, 1.3</td>
<td>2.5 0.013 1.2, 5.3</td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months</td>
<td>101 11.6</td>
<td>116 4.3</td>
<td>10 1.9</td>
<td>2.1 0.000 1.4, 3.2</td>
<td>0.3 0.061 0.1, 1.1</td>
<td>6.6 0.002 2.0, 22.2</td>
</tr>
<tr>
<td>History of STD</td>
<td>343 38.6</td>
<td>678 23.9</td>
<td>48 8.3</td>
<td>1.5 0.001 1.2, 1.8</td>
<td>0.4 0.000 0.2, 0.5</td>
<td>4.2 0.000 2.6, 6.7</td>
</tr>
</tbody>
</table>
3.3.8 Drug use

The prevalence of illicit drug use in both samples was low. About 4.3% of the participants (108/2,543) in 2007 reported any illicit drug use, which was a significantly higher proportion compared with 1.9% in 2006 (45/2,432). Across both years one third of the drug users reported ever injecting drugs. Few people reported having shared needles with others.

The illicit drug use behavior was analyzed by region in China. Participants were classified into two groups according to their residential location: South West (SW) and other provinces. The main objective was to ascertain whether MSM living in Provinces (SW) where the HIV epidemic was influenced by drug addiction were more likely to use drugs than MSM living in other regions. No regional differences in the prevalence of illicit drug use were observed.

<table>
<thead>
<tr>
<th>Variables</th>
<th>2006 (n = 2,432)</th>
<th>2007 (n = 2,543)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>45</td>
<td>1.9</td>
</tr>
<tr>
<td>Group B (Southwest)</td>
<td>12</td>
<td>1.6</td>
</tr>
<tr>
<td>Group A (other provinces)</td>
<td>33</td>
<td>2.0</td>
</tr>
<tr>
<td>Injecting drug use (total)</td>
<td>15 (45)</td>
<td>33.3</td>
</tr>
<tr>
<td>Needle sharing (total)</td>
<td>5 (15)</td>
<td>33.3</td>
</tr>
</tbody>
</table>
3.4 DISCUSSION

The sexual behavior of MSM has been more closely studied than that of any other group online given the abundance of gay-orientated websites and concerns about increasing transmission of HIV and other sexually transmitted infections [35]. However, most of these studies were conducted in developed countries. This online study is the first attempt to systematically explore risk behaviors and use of the Internet for sex seeking purpose among the Chinese MSM population. The results from this study provide important information on demographic characteristics, sexual behaviors, and sex seeking practices on the Internet and in traditional gay venues among gay websites users. Our principal findings both support and refute common beliefs and existing research about the association of HIV/AIDS risk behaviors with the Internet, and thus could provide important evidence for policy implications on HIV online HIV/AIDS surveillance and intervention in the future.

3.4.1 Gay website users: a young and educated subgroup of MSM in China

This study suggests that it is feasible to conduct HIV/AIDS behavioral surveys in China through Internet-based questionnaires. The wide use of gay websites among the Chinese MSM population provides a good opportunity to access a large number of participants across geographical and cultural boundaries. Within a four-month recruitment period, nearly 2,500 participants from all 31 Provinces in mainland China provided completed questionnaires in 2006 and 2007, respectively. Additionally, Internet-based surveys also offer some other advantages including confidentiality and a high degree of anonymity while collecting sexual and other sensitive data.
Gay website users in China represent a young and well-educated subpopulation of MSM. Approximately 80% of the respondents were less than 30 years old and more than 75% had a tertiary education or higher. Our findings are consistent with survey results among Chinese Internet users in general, conducted by the China Internet Network Information Center in 2006, which found that 71.5% of Chinese Internet users were less than 30 years old and 52.8% had an education of college or higher [113]. Young, well educated MSM may have more computer literacy or have more ready access to personal computers than older MSM in China [35]. These findings indicate that at present the Internet MSM users in China may represent a group of MSM who are different from those recruited in traditional gay venues. This provides an opportunity to reach those MSM who cannot be reached through conventional methods. The different characteristics of online MSM will be further explored in Chapter 4.

3.4.2 UAI and multiple sexual partnerships

This study showed that online Chinese MSM are vulnerable to HIV infection in view of the high number of sexual partners and high prevalence of unprotected anal intercourse.

In the 2006 sample, of those who had male-male sex in the past six months, less than half were at little or no risk for HIV infection. These participants either had no anal sex or always used condoms during anal sex. More than 56% had UAI in the past six months. This result is consistent with a community-based survey conducted in Beijing in 2002, which showed that 49% of MSM had UAI during insertive or receptive anal sex in the past six months [18]. The 2007 online sample shows similar results confirming that the rates of consistent condom use with regular, non-regular
and commercial partners are low. Approximately 58% had UAI with non-regular partners and 76% with regular partners in the past six months.

Unprotected anal intercourse is by far the highest risk behavior for HIV transmission among MSM [150]. However, the spread of HIV within a population depends on unprotected anal sex with people who have other partners. Both the 2006 and 2007 surveys show that, among those who had male-male sex in the past six months, most had multiple sexual partners with approximate 20% having six partners and over. These multiple partnerships carry a higher risk of HIV transmission by linking into a wider sexual network. Especially at the early stage of the HIV epidemic, the spread of HIV in a population relies more on multiple partnerships than UAI behaviors [151]. Intervention programs which discourage high numbers of partnerships and encourage mutual monogamy are urgently needed in China.

3.4.3 Condom use with regular, non-regular and commercial partners

Condom use is a critical element in a comprehensive, effective and sustainable approach to HIV/STI prevention and intervention among MSM. Various factors create barriers to condom use [151]. The results of this study provided persuasive evidence that the type of sexual partnership plays an important role in determining consistency of condom use. The findings are compatible with the hypothesis, as indicated by research on the relationship between partner type and condom use among women, that the smaller the affective distance between partners the less frequently condoms are used [150]. Gay website users are less likely to consistently use condoms with regular partners than with non-regular partners (24.5% vs. 42.1%). Men who were in commercial partnerships including paying for sex and exchanging sex for money showed higher rates of condom use consistency: 65.0% with paid
partners and 45.7% with paying partners. This is consistent with the assumption that commercial partnerships are less close than non-regular partnerships and non-regular partnerships are less intimate than regular partnerships.

When having sex with a male partner, the perceived risk of getting infected with HIV for MSM might be determined by the affective distance between partners. The greater the affective distance between partners, the higher the risk might be perceived of being infected with HIV. It is apparent that commercial sexual partners carry the highest risk of HIV transmission since they have a high turnover of sexual partners and are repeatedly exposed to risk of infection [42]. Thus participants are more likely to consistently use condoms in commercial partnerships. Our findings show that respondents who have sex casually with regular partners carry a lower risk for HIV infection than those who do not. In Chapter 2, the community-based behavioral surveillance has shown that MSM in China increasingly self-identify as homosexual and more are involved in stable relationships [43]. Therefore, whatever the reason is for reduced risk of HIV among MSM who have regular partners, creating a liberal society, reducing stigmatization and discrimination, and encouraging mutually faithful homosexual-relationships could be regarded as an effective strategy for HIV prevention among the MSM in China.

Although participants who engage in a regular partnership are at lower risk for HIV infection than others, unprotected anal sex with regular partners still carries risk for HIV transmission. Usually it is assumed that if MSM use condoms during sex with other partners, UAI in couples who know their HIV status and are sero-concordant represents no increased risk of HIV transmission within those partnerships [43]. Sexual behaviors should be evaluated by distinguishing between regular and non-
regular partners to avoid over-estimating levels of risk [115]. However, according to data shown in Table 3.3 1, only a few participants engaged in mutual faithful partnerships. Among those who had regular partners in the past six months, over 44% had more than one sexual partner during the same period; 38.5% had non-regular partners and less than half consistently used condoms with those partners In addition, 8% had sex with paid partners and 4.2% exchanged sex for money.

3.4.4 Reasons for not using condoms

In the 2007 survey, respondents were asked why they did not consistently use condoms when having anal sex. The mostly reported reason for not using condoms with regular partners was that respondents believed they were in a mutually faithful relationship (55%). This confirms the findings in several studies that trust is the principal barrier to condom use with regular partners [101, 152]. Condom use in a stable relationship may imply lack of commitment and trust [139].

Perceived risk of HIV infection also influences condom use with regular partners. About 17.7% of participants reported they did not use condoms because they did not think they could catch or pass HIV to others. Individuals may judge their risk of getting infected with HIV, and then decide whether or not to use a condom. The belief that clean and healthy looking men carry a low risk of HIV transmission is popular among the Chinese MSM population [81]. The degree of trust may be in parallel with the extent of perceived risk for HIV. The more a couple trusts each other, the less perceived risk they have of being infected with HIV.

Studies have shown that dislike of condoms is a major reason for not using condoms with non-regular partners [18, 40, 153]. In our study, however, unavailability of condoms was the mostly cited reason for not using condoms with non-regular
partners. Unavailability of condoms does not imply participants have no access to condoms or are not able to afford them. Few participants in this study reported such reasons. Price and lack of availability of condoms historically have been major barriers to condom use in China. This problem seems to have been solved through condom promotion including through social marketing [148]. In China, condoms are distributed in most hotels and entertainment establishments, and condom dispensers have been installed in some university campus in major cities. The reason behind unavailability of condoms may be the spontaneous nature of non-stable sexual encounters. In China, stigma is often attached to condoms because carrying a condom is often associated with sex workers or casual sex. MSM seldom carry condoms. In a situation of a spontaneous sexual encounter, MSM may not stop having sex if condoms are not available. This indicates that condom promotion should focus not only on provision of condoms but also on increasing their social acceptance.

Our findings show that dislike of condoms is a barrier to condom use with different type of partners. The belief that condoms reduce sensation and pleasure could be the reason for this fact [18], since only few people reported the quality of condoms was the reason for not using them. Nearly half the respondents who engaged in sex with paid partners reported this reason for not using a condom. If participants who are paid for sex are male sex workers, there may be unequal power between them and their clients which allows clients to reject the use of condoms [18, 98]. In such circumstances, sex workers’ power to negotiate condom use could be very limited. A study conducted in China among MSM suggests that the MSM male sex workers, so called “Money boys”, seldom insist on condom use when they are paid extra money [18]. However, a puzzling finding from this study suggests that an important reason
for not using condoms for the participants who exchanged sex for money was that they did not like using condoms themselves (32.1%). As discussed above, it is commonly believed that non-condom use in commercial sex reflects clients’ rejection. This finding requires further investigation.

3.4.5 Having sex with both males and females

For men who have sex with men, having sex with both males and females is regarded as a risk factor for HIV transmission. This is mostly because it increases the likelihood of transmission beyond the network of MSM [148, 154]. MSM are at high risk for HIV especially if partner turnover is high. If men who engage in high risk sexual behaviors also have sex with females, they can put their female partners at elevated risk for HIV infection unless their sexual contacts are protected by condom use. Our findings indicate that around 20% of gay website users also had sex with females in the past six months, and only 30% of them consistently used condoms. This indicates that approximately one in fifteen gay website users are playing the bridging role of spreading HIV from a relatively high risk group-MSM-to female partners and then to general population.

Being married is an important reason for gay website users to have sex with females. Over half of those who had sex with females during the past six months were married. The pressure to get married may come from different sources. Firstly, in traditional Chinese culture, boys are expected to fulfill a male’s role of being a son, a husband and a father by having a family and children with their family name to be carried on [42, 149]. Failure to fulfill these obligations may be viewed as an insult and disgrace to family members. The “one child policy”, which started in the late 1970s in China, makes the situation even worse. Secondly, individuals who do not get married at the
expected age in China may be seen to have psychological problems, or to be “losers” –situations associated with stigmatization and discrimination [148]. In recent years with increasing knowledge about homosexuality among Chinese society, a lack of female companionship is becoming more specifically attached with a homosexual orientation. All these pressures from family and society make some MSM choose to get married.

It is difficult to estimate the risk that females are facing resulting from sexual practices with male partners who have sex with men. The possibility of females being infected with HIV through sexual contact with MSM is relatively low at present in China given the low prevalence of HIV in the MSM population. This study provides a warning of the possibility that HIV may spread from MSM to a wider population of women, if there is a generalized HIV epidemic among MSM in the future.

3.4.6 Gay websites as a new meeting place in China

As reported in many developed countries, the Internet has been widely used to facilitate online dating and sex seeking [154, 155]. It is no surprise that this convenient mechanism for finding sex makes the Internet a new meeting ground for gay men in China that did not exist in the 1990s [154]. This survey supports the idea that the Internet provides a fast and efficient medium through which men can locate sex partners. The majority of respondents in both online samples reported successfully having used the Internet to find a male sexual partner. Almost half indicated that their main purpose for visiting gay websites was to look for sexual partners. When they were asked why they used the website to seek sexual partners, the common reason was that they were able to know more people and meet more
sexual partners. The potential for instant interaction with many people in a relatively anonymous fashion enhances the use of the Internet for sex seeking purposes [148].

Although currently seeking sexual partners seems to be the core purpose for visiting gay websites in the Chinese MSM population, nearly 40% of respondents also indicated that they were looking for a steady relationship. Thus gay websites are not only used for cruising. Online MSM users may expect or hope that long-term relationships may evolve with some of the men they initially meet as casual sex partners [43].

It was also noted that more than one third of respondents indicated that they were using the Internet to look for health information. Although no direct information was collected in this study about whether they would like to access sexual health information in particular through the Internet, this may have important potential value from a public health perspective. Several studies have indicated the important role of the Internet in prevention of STI/HIV. For example, a study conducted in the USA emphasized the important role of Internet-based male sex workers as potential sex educators for HIV and STIs [156]. Another study conducted in the UK also showed favorable attitudes towards online health promotion: over three quarters of online MSM users would allow a health educator on a gay chat room and would click on a banner to find out about sexual health [156]. The potential of the Internet as a venue for intervention, outreach and health promotion and its difference from traditional approaches to the delivery of intervention programs are not clear, especially for the Chinese MSM population. A number of questions need to be answered. Is it possible to intervene with MSM while they are seeking sex partners
online? Are existing efforts adaptable to the Internet? Future studies are needed to address these questions.

3.4.7 Gay websites as a new risk environment for HIV/AIDS

The results from this study indicate that the Internet has become a newly emerging risk environment for HIV/AIDS among the Chinese MSM population, which is similar to other published results [157]. The proportion of participants who had used the Internet to look for sexual partners is similar to a study conducted in UK, in which 82% of MSM surveyed online had looked for a sexual partner on the Internet [23]. The online MSM population in China is vulnerable to HIV/AIDS in view of the low prevalence of consistent condom use and their high number of male sexual partners. Effective intervention strategies targeting increasing condom use and decreasing the number of partners are crucially needed.

Studies conducted in developed countries also indicate that men who sought sexual partners on the Internet were more likely to have an STD and to have unprotected anal intercourse [17], and thus were at higher risk of being infected with HIV than those who did not [23, 28, 29]. A study conducted in Hong Kong also showed that seeking sex on the Internet was associated with having contracted a sexually transmitted disease, having more than three sexual partners and having engaged in anal sex [158]. To explore whether participants who seek sex in different ways have various levels of risk for HIV transmission, a multivariate logistic regression analysis was performed by dividing participants into three groups: men seeking sexual partners both in traditional gay venues and via the Internet, men seeking partners only on the Internet and men seeking partners in other ways (Table 3.3 15). Our results show a gradual decrease in the risk of HIV transmission from the group of
seeking sex both on the Internet and in gay venues, to the group of Internet only and finally to the group seeking sex in other ways.

Gay website users who seek sexual partners both in gay venues and on the Internet were at highest risk for HIV infection compared with other two groups. It is not difficult to understand this considering cruising in gay venues and searching on the Internet are the most common ways for Chinese MSM to seek sexual partners [31, 127]. An US survey indicates that bars/clubs, bathhouses and the Internet are the most endorsed venues for meeting partners [31]. Thus those who seek partners both on the Internet and in traditional gay venues are likely to have a high turnover of sexual partners and to be at the higher end of the spectrum of risk behavior.

This study shows that the men who seek partners both on the Internet and in traditional gay venues shared similar demographic characteristics with the other two groups except that they were more likely to be older and less likely to be students. Gay venues in China such as bars, club and bathhouses usually charge an entrance fee or require a minimum expenditure within these venues. Expensive charges may prohibit less affluent young MSM and students from frequenting these venues.

Although the capacity of the Internet to facilitate fast and anonymous sexual encounters make it popular among the Chinese MSM population, traditional gay venues still play an important role in the sex seeking process. Nearly half gay website users visited traditional gay venues and 40% of these users sought sexual partners there. Interestingly when asked why they choose the Internet to seek sexual partners, 38% of respondents reported that they were tired of cruising in traditional gay venues. This suggests that in the future more and more MSM might switch to using the Internet to seek sexual partners instead of traditional gay venues. Gay and
bisexual men have historically utilized many environments to meet potential partners including commercial venues such as bars, gyms, bath houses and public venues such as parks, beaches and public toilets [10]. In China, gay venues firstly emerged in the late 1990s in major cities, and then gradually found their way to other cities. [110] These venues provide a platform for MSM to communicate and socialize, but also may enhance the transmission of HIV/AIDS. More recently, as a response to the potential HIV epidemic among MSM in China, free condoms, AIDS awareness posters and even safe-sex themed dance/drama performances are used as tools by owners of gay bars or bath houses to educate patrons about HIV/AIDS prevention [127].

As described above, studies have indicated increased levels of risky sexual behaviors and sexually transmissible infections (STIs) among MSM who seek sex on the Internet. This study is not able to provide clear evidence as to whether men who seek sex on the Internet are at higher risk for HIV infection than those who do not because all participants of this study are MSM who visit gay websites and most have sought sex through the Internet successfully. No comparison can be made with those who do not seek sex on the Internet. Our findings show that participants who sought partners on the Internet only were more likely to have UAI, have a higher turnover of sexual partners and have a STD history than those who seek sex in other ways. These are strong indications that the Internet has become a risk environment for HIV transmission among MSM in China.

3.4.8 Drug use

Drug use among the Chinese MSM population has been analyzed by region given the geographic distribution of illicit drug use in China. It was assumed that the MSM
living in Southwest China, where drug use is one of the primary reasons for the increasing number of people infected and affected by HIV/AIDS such as Yunnan, Guangxi, Sichuan, Xinjiang, might be at higher risk for HIV through drug injection than the MSM in other regions. This study showed that the prevalence of injecting drug use was very low among gay website users across the country and no regional differences were found in the prevalence of illicit drug use. Fewer than 4% of the overall sample reported any illicit drug use and injecting drug use was extremely low. The low prevalence of injecting drug use suggests that currently male-male sex transmission may be the main mode of HIV transmission among the Chinese MSM population.

The 2007 sample appeared to have a higher prevalence of illicit drug use than the 2006 sample. The prevalence in 2007 was 4.3% while it was only 1.9% in 2006. It is difficult to conclude drug use is increasing among gay website users in China based on two rounds of data. Furthermore, the change of website that was used to advertise the project in the 2007 survey could also be a reason for such change as discussed above. Obviously, continuous monitoring is needed to track any trends in drug use and explore its impact on HIV transmission among MSM.

3.4.9 Limitations

This study has several sources of potential biases associated with Internet-based surveys in addition to technological issues specific to the Internet. Several important limitations should be kept in mind in interpreting the findings from this study.

**Sampling**

Sampling may be one of the most important challenges of Internet-based data
Chapter three: Internet-based HIV/AIDS behavioral surveys

collection [127, 159]. Selection bias resulting from a convenience sample may limit the generalizability of research findings.

First, the target population of this project is Chinese gay website users. Participants were recruited only through three selected gay oriented websites. Use of such gay websites may be primarily to facilitate meeting sexual partners. Thus participants in this survey may potentially represent a group with higher risk-behaviors than other MSM Internet users. Additionally, a convenience sampling method was used and participation in the study was based on participants’ self interest. No data can be obtained on the differences between those who participated and those who did not. A response rate cannot be calculated either because of the unknown number of potential respondents who received recruitment materials or examined the study website but chose not to participate [44]. However, such sampling issues are pervasive in behavioral surveys among MSM. Most such surveys are based on self-selected rather than probability samples. Any potential selection bias in this study could be compensated for by the large sample size, the wide geographic area and the reduced response bias resulting from the anonymous and confidential nature of Internet-based surveys [96, 104].

Second, although respondents to the two online surveys covered all 31 Provinces of China, there were disproportionately more participants recruited from Heilongjiang and Yunnan provinces as the two websites on which the study was advertised are located in Heilongjiang and Yunnan, and most of their visitors are from local areas. However, our results indicate that participants from these two provinces share broad demographic similarities with participants from other Provinces. This selection may
have little impact on the generalizability of survey findings to the population of MSM gay website users in China.

Third, although China is experiencing a rapid growth rate of Internet users, MSM living in rural areas or lacking basic computer skills may be out of reach of the Internet sample. Research has shown that MSM who have computer skills are wealthier and more educated and tend to be more likely to participate in online surveys than others [102]. Our findings show that the online samples were mostly young and well educated. These online samples reflect characteristics of a 2006-random sample of Chinese Internet users in terms of social demographic characteristics [81]. In China, young and well educated people are more likely to access the Internet. With growing Internet users, Internet-based data collection may become a more realistic possibility [17]. In the next Chapter, demographic differences between the online and the community samples of MSM will be explored, which will provide extra evidence to describe characteristics of Chinese gay website users.

Finally, MSM present a universal problem when accessing the generalizability of survey findings [98]. Since the MSM population has never been enumerated in any country, it is difficult to determine whether MSM who participate in online surveys are representative of MSM who use the Internet or of MSM in general. In this study, it is not appropriate to generalize our findings to the general MSM population, since substantial differences have been observed between the online and community samples (this will be discussed in the next chapter). The target population should be restricted to the MSM who use the gay websites in China.
Data validity and quality

Data validity and quality is another challenge for almost all Internet-based surveys. First, it is very difficult to verify participants’ identity and intention to participate in the study. Because the study websites are open to all people who can access the Internet, some who are heterosexual or not eligible for this study may simply fabricate information to participate just because of their curiosities. In 2006, 210 participants (7.3%) reported having no male-male sex in the previous twelve months and the proportion (16.3%) was even higher in 2007.

Second, another threat to data quality in anonymous Internet surveys is the difficulty to verify the validity of responses. However, the perceived safe and anonymous nature of the Internet may help to elicit more information on sensitive questions. A growing number of studies have indicated higher reporting of sexual and drug-using behaviors with computer-based compared to face-to-face interviews [17, 160]. Errors resulting from variation in survey administration, interviewers’ interpretation and data entry are prevented [17]. Our study indicated that some respondents provided very detailed and self-disclosing information to several semi-open questions, such as self identified sexual orientation and the purpose for using gay websites.

Third, the meaning attached to some questions in the questionnaire may have varied by respondents. It is difficult to evaluate whether participants truly understand the questions and researchers have no chance to interpret because of the nature of self-administrated online surveys. Misunderstandings about questions are possible and the limitations they introduce to the study are recognized.

Furthermore, compared to in-person interviewing, online surveys have fewer social and interviewer constraints, which, as a result, increases the possibility of a high rate
of missing values. Possible reasons for missing venues have been described in Section 3.2.8. Comparison results showed in Table 3.3 indicate that participants with missing values to key indicators are broadly similar in demographic characteristics to those without missing values. These missing values might have little impact on major findings and the interpretation of the survey results.

Finally, online surveys are likely to be influenced by factors that are beyond of researcher’s control. During the 2007 online survey, one of the gay websites on which the study was advertised was hacked and another website was enrolled as a substitute. The selection bias resulting from changing websites may have potential influences on tracking the trend in risk behaviors in that the target population might be changed.

**Study design**

As discussed in Chapter Two, MSM in China are increasingly living with a steady partner or in a serious relationship. Because unprotected anal sex between stable partners may represent little or no risk for HIV transmission if MSM consistently use condoms in any sex with other partners, risky sexual behaviors in the 2007 online survey were evaluated by distinguishing between regular and non-regular partners. However, this makes it difficult to track changes in the prevalence of UAI by partnerships. In addition, defining regular and non-regular partners may be difficult, particularly in China, where homosexual behaviors are still stigmatized. In this study, a regular partner is defined as a partner whom the respondent is either married to, currently is living with, or is in a serious relationship with (boy friends). Respondents may have different understandings regarding classification of partnerships. It was observed that a few respondents (less than 4%) who reported having at least one
male partner in the past six months did not report any information on sexual behaviors with regular, non-regular and commercial partners. These participants may be confused during survey as to how to classify their partners. Furthermore, information on HIV test history and HIV status were not collected in the two online surveys since HIV prevalence in the study area is relevant low [113] and a short online questionnaire may increase response rate. Also, sexual behaviors were not evaluated by HIV sero-status in this study.

3.5 CONCLUSION

The Internet has become a widely used meeting place for Chinese men who have sex with men, not only for sexual purposes but also at a social level. The Internet has also become a risk environment for HIV transmission among Chinese gay website users in view of their high number of sexual partners and low condom-use consistency. This provides a unique platform to conduct behavioral surveillance among those who cannot be contacted in the traditional gay community and to provide HIV/AIDS prevention and intervention for them in an Internet era.
CHAPTER FOUR

DIFFERENCES IN DEMOGRAPHIC CHARACTERISTICS AND RISKY BEHAVIORS BETWEEN INTERNET AND COMMUNITY SAMPLES OF MEN WHO HAVE SEX WITH MEN

—Implications for HIV/AIDS behavioral surveillance among MSM in China
Chapter four: Differences between Internet and community samples of MSM

4.1 INTRODUCTION

Behavioral surveillance among men who have sex with men (MSM) is an essential component of a comprehensive HIV/AIDS surveillance system, especially at the stage of an early HIV epidemic[35, 113]. The coverage of HIV/AIDS behavioral surveillance among the Chinese MSM population, however, could not meet the requirements for public health practices [35, 113]. As discussed before, there is only one HIV sentinel surveillance site among MSM in a northern Chinese city, which was set up in 2002. HIV/AIDS behavioral surveillance among this group in six cities commenced in 2004. These surveillance sites are not functioning very well for various reasons including: 1) the vast size and different nature of the Chinese MSM population [101]; 2) difficulties in reaching MSM because of their preference for anonymity and fear of exposure resulting from stigmatization and discrimination [101, 113, 139]; 3) prohibitive costs of conducting behavioral surveys in a community setting with limited health resources in China; and 4) low HIV prevalence among the Chinese MSM population, which makes MSM a lower priority because it is perceived that HIV transmission through drug addiction and heterosexual contacts (mostly commercial sex) are more important than homosexual transmission [161].

An increasing number of Internet-based behavioral surveys have been conducted among the MSM population around the world because using the Internet provides advantages over the traditional pen-paper investigations [113, 162, 163]. Internet-based surveys are cost-effective and provide respondents the opportunity to answer questions anonymously and maintain their privacy. The Internet also provides a limitless number of potential respondents [3, 42, 85, 98, 164]. These advantages
presented by the Internet may solve some of common challenges that community-based behavioral surveillance is facing among the Chinese MSM population. Internet use in China has been increasing rapidly with more than 130 million people accessing the Internet regularly in China by the end of 2006 [17]. Evidence also shows that Chinese MSM are avid users of the Internet for dating and sexual purposes [84].

Although successful web-based behavioral surveys among MSM have been reported in developed countries, no such research has been conducted in China. China’s conservative culture surrounding sex and stigmatization and discrimination against homosexuals [17, 23] make it difficult to directly borrow behavioral surveillance experience from other countries. In view of the potential benefits associated with conducting behavioral surveillance on the Internet among the Chinese MSM population, it is important to determine whether the online MSM population represents a new subgroup that is different from current surveillance samples in which participants are recruited from traditional gay venues and whether the online MSM population is at higher risk for HIV transmission.

In addition, comparisons of the difference in risk for HIV transmission between the two subpopulations will provide extra evidence to evaluate the risk for HIV infection that actually exists among the Chinese MSM. Most HIV/AIDS behavioral surveys that have been conducted among MSM in China, including the national sentinel and behavioral surveillance, recruit participants from traditional gay venues such as gay bars, bath houses, parks or public toilets [26, 27, 32, 35, 44, 139, 145, 165-167]. Reports based on these surveys have limitations in sampling methods and generalizability of survey results (see Chapter 2). However, the findings from these
Chapter four: Differences between Internet and community samples of MSM

studies have been widely cited and generalized, and most of them have concluded that “China is experiencing an emerging HIV/AIDS epidemic among men who have sex with men” [13, 17, 39, 42, 87, 145]. Considering MSM might intentionally congregate in the traditional gay venues to seek sexual partners and therefore might be at higher risk for HIV infection and transmission than the online MSM population, the surveillance results from community-based surveys might give misleading results and the observed HIV risk may overestimate the risk that exists.

Studies conducted in developed countries have shown both differences and similarities in demographics and sexual behaviors of MSM recruited online and offline [43, 85, 143]. A Swedish survey showed participants recruited from the Internet were more likely to be younger, and less educated and identify themselves as bisexual, but no significant differences in key risky sexual behaviors were observed [91]. A survey conducted in the UK indicted similar differences of demographic characteristics to the Swedish study, but the online sample was more likely to have unprotected anal sex [40]. An US study compared 383 online respondents to 116 respondents recruited in bars in Birmingham and found that the Internet sample was more likely to be older, bisexual and to have lower education levels, more likely to have an STD infection history and to be HIV positive but less likely to engage in unprotected anal intercourse [134].

Given the differences in cultural, religious and economic situations in different countries, it is difficult to draw a clear conclusion from these studies as to the differences between online and community MSM samples. Moreover, it is difficult to apply these results from developed countries to the Chinese MSM population because of the unique nature of China’s social and economic system and traditional
conservatism about sex [85]. Therefore, the aim of this study was to compare the differences in demographic characteristics and sexual behaviors between the MSM recruited through the Internet and those from traditional gay venues, and thus to provide insights for future HIV/AIDS behavioral surveillance, epidemic estimation and prediction as well as health interventions among the Chinese MSM population.

4.2 METHODS

This study compared the demographics and risk behaviors of two samples of MSM in 2006, using cross-sectional data that were collected via the Internet and through conventional venue-based outreach. Most respondents in the two samples were from Harbin, the capital city of Heilongjiang Province in Northeast China. Based on previous research among MSM in China, it was estimated that 600 participants in both the samples needed to be recruited in order to detect a 10% difference in key risk behaviors based on a 95% level of significance with 85% power assuming a design effect of 1.5.

4.2.1 Internet sample

The Internet sample was a subset of the 2006 Internet survey among MSM in China, which has been described in Chapter 3. Participants living in Heilongjiang Province were extracted from the Internet survey dataset to compare with the community survey conducted in Harbin. Most respondents of the Internet sample were recruited through the gay website-\texttt{http://www.aixinsky.com}. In total, 634 online questionnaires were submitted, of which 46 questionnaires were incomplete and three had signs of intentional deception. Of the 585 participants who submitted completed questionnaires, 368 (62.3%) lived in Harbin, 56 (9.6%) in Daqing, 43 (7.4%) in
Chapter four: Differences between Internet and community samples of MSM

Qiqihar, 40 (6.8%) in Mudanjiang and 78 (13.3%) living in other cities nearby. Figure 4-1 shows the location of the cities mentioned above.

4.2.2 Community sample

The community sample was from the 2006 behavioral survey in Harbin, which was introduced in Chapter 2. Participants were recruited from traditional gay venues and interviewed by health professionals. From July 1 to August 30, 2006, a total of 647 men were interviewed. In this study 642 participants were included in the final analysis (Five questionnaires were identified as incomplete using the same exclusion criteria as for the Internet sample). Of the 642 participants, 222 (34.3%) were recruited in gay bars, 339 (52.3%) in gay public bath-houses, and 87 (13.4%) in venues such as public toilets or parks. The majority of these participants were living in Harbin before participation in the study.

It should be noted that the community sample and the online sample appeared to be not drawn from the same geographic areas. The online sample comprised MSM living in Heilongjiang Province while the community comprised MSM living in Harbin. However, because Harbin is the capital city of Heilongjiang Province, some MSM in the community sample, who lived in small cities or towns near Harbin and visited Harbin very frequently, were also recruited in the community sample. Because we did not ask the participants from the community sample how long they have lived in Harbin, we were not able to distinguish participants who lived in Harbin and those who did not. Of the 585 participants who were recruited online, nearly two thirds lived in Harbin, and the others lived in cities nearby. We compared the differences in demographic characteristics and key risk behaviors between the two groups and no significant differences were detected. Therefore, we think that
Chapter four: Differences between Internet and community samples of MSM

even the online sample was restricted to the 368 participants living in Harbin, the community and online sample are not necessarily comparable. Since no significant differences were observed between the participants living in Harbin and those who did not in the online sample, we compared participants living in Heilongjiang Province in the online sample with the community sample.

4.2.3 Data collection

The data collection process and design of questionnaire for both surveys have been introduced in Chapters 2 and 3 respectively.

4.2.4 Statistical analysis

Data from the two surveys were merged into one database and analyzed using Stata 9. To detect between-group differences, online data were compared with community data using chi-square tests for categorical variables and Kruskal-Wallis or student-t tests for continuous variables. Differences in key risk behaviors between community and Internet samples were further explored in multivariate logistic regression analyses as shown in Table 4.3. Key risk behavioral factors were the dependent variables and the independent variable was the mode of recruitment: online and offline. Age, education, marriage status, student status and self-reported sexual orientation were adjusted in the logistic models as potential confounding factors. Multivariate models were modified through backward elimination logistic regression by dropping potential confounding factors with p values greater than 0.10 [43, 94]. UAI was defined as the number of respondents who did not use a condom every time they had anal sex with a male partner in the previous six months divided by the total number of all participants [39]. HIV status concordance between partners
(concordant or discordant) was not considered in this study since HIV prevalence in the study area is low and few gay men know their HIV status.

Figure 4-1 Map of the Heilongjiang Province
4.3 RESULTS

4.3.1 Demographic characteristics

The demographic comparisons between the community and Internet samples are presented in Table 4.3. There were few similarities in terms of demographic characteristics between the two samples.

Age

The Internet sample is significantly younger than the community sample. The mean age of the Internet sample was 25.6 years old (median 24; range 18-51), while the community sample had a mean age of 30.4 years (median 27; range 18-69). The community sample also had a higher proportion of men aged over forty as shown in Figure 4.2.

After adjusting for student status, participants who are not students in the Internet sample are still younger than the participants in the community sample. No significant difference in the age distribution was observed among students between the two samples. (Table 4.3)

Education and marital status

The education level of the Internet sample was significantly higher than that of the community sample. Over three fourths of the Internet sample (75.2%) had a tertiary education of or above, while over half of the community (58.3%) had a high school education of or below.

Most of the participants in both samples were not married. The proportion of participants who reported being married in the community sample was higher than
that in the Internet sample (23.5% vs. 15.8%), although this could be confounded by age.

**Employment and occupation**

Most participants reported being employed at the time of the survey either in a full time or part time job. No significant differences were observed between the two samples regarding employment (community 71.4% vs. Internet 66.6%, \( p = 0.072 \)).

The Internet and community samples showed significant differences in their occupations. Participants in the Internet sample were more likely to be students than the community sample (32.3% vs.17.6%, \( p < 0.001 \)). The community sample tended to have higher proportions of manual factory workers (23.8% vs. 5.4%) and self-employed business men (20.8% vs. 6.9%). However, it should be noted that a higher proportion of the Internet participants reported other occupations that were not enumerated as coded answers, of whom technical workers (22.8%, 41/180) and civil servants (10.0%, 18/180) were the most commonly reported. *(Table 4.3 2)*

**Sexual orientation**

As shown in *Figure 4- 3*, most participants in both samples identified themselves as homosexual. Men in the community sample were more likely to identify themselves as homosexual than the men from the Internet sample (79.6% vs. 62.3%) and less likely as bisexual (16.8% vs. 25.5%). Also, fewer men in the community sample reported being unclear about their sexual orientation compared to the Internet sample (2.4% vs. 9.7%).
Chapter four: Differences between Internet and community samples of MSM

Table 4.3 1 Age difference between the two samples by student status, 2006

| Occupation | Age | Community | | Internet | | p |
|------------|-----|-----------||-----------||-----|
|             | n   | %         | | n         | | % |
| Student     |     |           | |           | |   |
| ≤20         | 26  | 26.3      | | 40        | | 31.5 |
| 21-30       | 70  | 70.7      | | 87        | | 68.5 |
| ≥31         | 3   | 3.0       | | 0         | | 0.0 |
| Mean ± SD   | 22.0| 2.63      | | 21.5      | | 1.93 |
| Non-student |     |           | |           | |   |
| ≤20         | 27  | 5.8       | | 21        | | 8.4 |
| 21-30       | 211 | 45.6      | | 155       | | 62.0 |
| 31-40       | 125 | 27.0      | | 62        | | 24.8 |
| ≥41         | 100 | 21.6      | | 12        | | 4.8 |
| Mean ± SD   | 32.4| 9.42      | | 27.7      | | 6.39 |

a Fisher’s exact test
b Student t test
c Chi square test
Chapter four: Differences between Internet and community samples of MSM

Figure 4-3 Difference in sexual orientation between the community and Internet samples, 2006
### Table 4.3 Differences in demographic characteristics between the Internet and community samples, 2006

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Community (n = 642)</th>
<th>Online (n = 585)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤20</td>
<td>73</td>
<td>11.4</td>
<td>65</td>
</tr>
<tr>
<td>21-30</td>
<td>317</td>
<td>49.5</td>
<td>262</td>
</tr>
<tr>
<td>31-40</td>
<td>137</td>
<td>21.4</td>
<td>66</td>
</tr>
<tr>
<td>≥41</td>
<td>114</td>
<td>17.8</td>
<td>13</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior high school or less</td>
<td>102</td>
<td>16.0</td>
<td>27</td>
</tr>
<tr>
<td>Senior high school</td>
<td>270</td>
<td>42.3</td>
<td>112</td>
</tr>
<tr>
<td>College</td>
<td>267</td>
<td>41.8</td>
<td>421</td>
</tr>
<tr>
<td><strong>Marriage status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>491</td>
<td>76.5</td>
<td>491</td>
</tr>
<tr>
<td>Currently married</td>
<td>151</td>
<td>23.5</td>
<td>92</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>455</td>
<td>71.4</td>
<td>371</td>
</tr>
<tr>
<td>Unemployed</td>
<td>182</td>
<td>28.6</td>
<td>186</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>99</td>
<td>17.6</td>
<td>173</td>
</tr>
<tr>
<td>Manual workers in factories</td>
<td>134</td>
<td>23.8</td>
<td>29</td>
</tr>
<tr>
<td>Self employed business man</td>
<td>117</td>
<td>20.8</td>
<td>37</td>
</tr>
<tr>
<td>Teacher or doctor</td>
<td>64</td>
<td>11.4</td>
<td>62</td>
</tr>
<tr>
<td>Waiters in hotels or restaurants</td>
<td>39</td>
<td>6.9</td>
<td>8</td>
</tr>
<tr>
<td>Secretary</td>
<td>27</td>
<td>4.8</td>
<td>11</td>
</tr>
<tr>
<td>Driver</td>
<td>27</td>
<td>4.8</td>
<td>4</td>
</tr>
<tr>
<td>Serving in the army</td>
<td>6</td>
<td>1.1</td>
<td>30</td>
</tr>
<tr>
<td>Farmers</td>
<td>3</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>47</td>
<td>8.4</td>
<td>180</td>
</tr>
<tr>
<td><strong>Sexual orientation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homosexual</td>
<td>508</td>
<td>79.6</td>
<td>342</td>
</tr>
<tr>
<td>Bisexual</td>
<td>107</td>
<td>16.8</td>
<td>140</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>8</td>
<td>1.3</td>
<td>14</td>
</tr>
<tr>
<td>Undecided / do not know</td>
<td>15</td>
<td>2.4</td>
<td>53</td>
</tr>
</tbody>
</table>

* Pearson Chi square test
4.3.2 Sexual behaviors

Age at first sex

Participants in both samples had their first sex at the median age of 19 years old. No significant difference was observed between the two samples. The mean age was 19.5 years old for the community sample and 18.9 years for the Internet sample (Kruskal Wallis test, $^2 = 3.595, p = 0.058$). However, when participants were divided into three subgroups according to their age of first sex, significant differences emerged. The Internet sample tended to have a higher proportion of participants having first sex at the age of less than fourteen years old (Table 4.3 3).

As shown in Table 4.3 3, compared with the community sample, the Internet sample appeared to be more likely to have had first sex with males rather than with females (Fisher’ exact test, $p < 0.001$). After adjusting for age, no significant differences in the proportion of having first sex with a male between the two samples were observed (Table 4.3 4).

Having sex with females

As shown in Table 4.3 6, the two samples reported significant differences in the proportions having sex with females during the previous six months. Engaging in sex with a female during the past six months was reported by 24.8% of the community sample, which was significantly higher than the Internet sample (16.9%). Of those, in both samples, who had had female partners in the past six months, the median number of female partners was one (25%-75% percentiles, 1-2).
As shown in Table 4.3 5, having sex with females was associated with marriage status. Of those who were not currently married in both samples, no significant difference in the proportion having sex with females was observed between the two samples ($p = 0.536$). Those who were married in the community sample were slightly more likely to have sex with females than of the Internet sample ($p = 0.050$). However, the multivariate analysis indicated that the difference between two samples was still significant after controlling for age, education, student status, marriage and sexual orientation. The community sample was two times more likely to have had sex with females in the past six months than the Internet sample ($AOR \ 2.01, CI \ 1.22-3.30, p = 0.006$).

As shown in Table 4.3 6, among those who had sex with females in the past six months, condom use differed significantly between the two samples. Participants in the community sample were more likely to never use a condom (69.1% vs. 36.4%) and less likely to always use condoms (0.0% vs. 26.0%) than the online participants. None of the community sample reported having consistently used condoms with female partners.
### Table 4.3 3 Distribution of age at first sex by samples

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Community</th>
<th></th>
<th>Internet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Age at first sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤14</td>
<td>19</td>
<td>3.0</td>
<td>72</td>
<td>13.3</td>
</tr>
<tr>
<td>15-20</td>
<td>438</td>
<td>68.6</td>
<td>302</td>
<td>55.9</td>
</tr>
<tr>
<td>≥21</td>
<td>181</td>
<td>28.4</td>
<td>166</td>
<td>30.7</td>
</tr>
<tr>
<td>Gender of first sexual partner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>484</td>
<td>75.6</td>
<td>477</td>
<td>84.9</td>
</tr>
<tr>
<td>Female</td>
<td>156</td>
<td>24.4</td>
<td>85</td>
<td>15.1</td>
</tr>
</tbody>
</table>

### Table 4.3 4 Association between age and gender of first sexual partner

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Community</th>
<th></th>
<th>Internet</th>
<th></th>
<th>P^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>63</td>
<td>87.5</td>
<td>54</td>
<td>90.0</td>
<td>0.141^a</td>
</tr>
<tr>
<td>21-30</td>
<td>268</td>
<td>84.8</td>
<td>228</td>
<td>90.5</td>
<td>0.393^b</td>
</tr>
<tr>
<td>≥ 31</td>
<td>138</td>
<td>55.0</td>
<td>49</td>
<td>65.3</td>
<td>0.112^b</td>
</tr>
</tbody>
</table>

^a Fisher’s exact test  
^b Pearson Chi square test

### Table 4.3 5 Association between marriage status and having sex with females

<table>
<thead>
<tr>
<th>Marriage status</th>
<th>Having sex with females</th>
<th>Community</th>
<th>Internet</th>
<th>P^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Married</td>
<td>Yes</td>
<td>112</td>
<td>74.2</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>39</td>
<td>25.8</td>
<td>33</td>
</tr>
<tr>
<td>Unmarried</td>
<td>Yes</td>
<td>47</td>
<td>9.6</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>444</td>
<td>90.4</td>
<td>424</td>
</tr>
</tbody>
</table>

^a Chi square test
Table 4.3 Differences in risk sexual behaviors between the community and Internet samples, 2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>Community (n = 642)</th>
<th>Online (n = 585)</th>
<th>( p^* )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Having sex with females in the past 6 months</td>
<td>159</td>
<td>24.8</td>
<td>93</td>
</tr>
<tr>
<td>Number of female partners in the past 6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>483</td>
<td>75.2</td>
<td>457</td>
</tr>
<tr>
<td>1</td>
<td>115</td>
<td>17.9</td>
<td>57</td>
</tr>
<tr>
<td>≥2</td>
<td>34</td>
<td>5.3</td>
<td>20</td>
</tr>
<tr>
<td>No response</td>
<td>10</td>
<td>1.6</td>
<td>51</td>
</tr>
<tr>
<td>Condom use during sex with females</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>103</td>
<td>69.1</td>
<td>28</td>
</tr>
<tr>
<td>Sometimes</td>
<td>35</td>
<td>23.5</td>
<td>21</td>
</tr>
<tr>
<td>Always</td>
<td>0</td>
<td>0.0</td>
<td>20</td>
</tr>
<tr>
<td>No response</td>
<td>11</td>
<td>7.4</td>
<td>8</td>
</tr>
<tr>
<td>Having sex with males in the past 6 months</td>
<td>629</td>
<td>98.0</td>
<td>520</td>
</tr>
<tr>
<td>Number of male sexual partners in the past six months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>2.0</td>
<td>58</td>
</tr>
<tr>
<td>1</td>
<td>39</td>
<td>6.1</td>
<td>127</td>
</tr>
<tr>
<td>2-5</td>
<td>219</td>
<td>34.1</td>
<td>252</td>
</tr>
<tr>
<td>6-20</td>
<td>251</td>
<td>39.1</td>
<td>96</td>
</tr>
<tr>
<td>≥21</td>
<td>109</td>
<td>17.0</td>
<td>21</td>
</tr>
<tr>
<td>No response</td>
<td>11</td>
<td>1.7</td>
<td>24</td>
</tr>
<tr>
<td>Having insertive anal sex in the past six months</td>
<td>423</td>
<td>68.6</td>
<td>406</td>
</tr>
<tr>
<td>Condom use during the insertive anal intercourse with men</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>63</td>
<td>14.9</td>
<td>104</td>
</tr>
<tr>
<td>Sometimes</td>
<td>207</td>
<td>48.9</td>
<td>165</td>
</tr>
<tr>
<td>Always</td>
<td>152</td>
<td>35.9</td>
<td>88</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>0.2</td>
<td>49</td>
</tr>
<tr>
<td>Having receptive anal sex in the past 6 months</td>
<td>396</td>
<td>64.8</td>
<td>348</td>
</tr>
<tr>
<td>Condom use during the receptive anal intercourse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>85</td>
<td>21.5</td>
<td>98</td>
</tr>
<tr>
<td>Sometimes</td>
<td>199</td>
<td>50.3</td>
<td>162</td>
</tr>
<tr>
<td>Always</td>
<td>112</td>
<td>28.3</td>
<td>73</td>
</tr>
<tr>
<td>No response</td>
<td>0</td>
<td>0.0</td>
<td>15</td>
</tr>
<tr>
<td>UAI among all participants</td>
<td>406</td>
<td>70.7</td>
<td>353</td>
</tr>
</tbody>
</table>

* Pearson Chi square test
**Having sex with males**

Sexual behaviors with males are shown in Table 4.3 6. The majority in both samples had engaged in male-male sex during the previous six months (98.0% community sample vs. 90.0% Internet sample, \( p < 0.001 \)). Among those who had had male-male sex, participants from the two samples reported significantly different numbers of male sexual partners in the previous six months. The mean number of male partners for the community sample was 13.5 ± 16.8 (median 7, range 1-100), whereas it was 6.0 ± 12.2 (median 3, range 1-100) for the Internet sample. The community sample tended to have a higher proportion having \( \geq 6 \) male partners than the Internet sample (46.1% vs. 20.2%). After controlling for age, education, marriage status, student status and sexual orientation, the community sample was nearly five times more likely to have \( \geq 6 \) male partners in the previous six months than the Internet sample (AOR 4.88, CI 3.51-6.80, \( p < 0.001 \)) (Table 4.3 8). Those who had a tertiary education level or above (AOR 0.63, CI 0.46-0.86, \( p = 0.003 \)) and those who were students (AOR 0.57, CI 0.39-0.84, \( p = 0.004 \)) were less likely to have \( \geq 6 \) male partners in the previous six months than others.

The Internet sample appeared to have a higher proportion of participants who reported having had insertive anal sex with males in the past six months than the community sample (79.3% vs. 68.6%, \( p < 0.001 \)). Of those who had insertive sex in the past six months, the community sample was more likely to always use condoms (35.9% vs. 21.7%) and less likely to never use a condom during male-male sex (14.9% vs. 25.6%) than the Internet sample.

The proportion of having receptive anal sex during the past six months was not significantly different between the two samples (64.8% vs. 68.9%, \( p = 0.161 \)).
Among those who reported engaging in receptive anal sex, 28.2% reported having never used a condom and 21.0% reported always using condoms in the Internet sample, whereas the proportions in the community sample were 21.5% and 28.3%, respectively.

The Internet sample tended to have a lower rate of consistent condom use than the community sample. However, when using the total sample size as the denominator to calculate the indicator of UAI, no significant difference in the prevalence of UAI between the two samples was identified by logistic analysis, after controlling for age, marriage, student status, education and sexual orientation ($AOR \ 1.02, CI \ 0.73-1.43, p = 0.905$) ($Table \ 4.3 \ 11$). This could be due to a higher proportion of men who reported having no male-male sex in the past six months in the Internet sample than in the community sample (10.0% vs. 2.0%).

**Commercial sex behaviors**

As shown in $Table \ 4.3 \ 7$, the Internet sample appeared to have a higher proportion having a lifetime history of paying for sex than the community sample (10.6% vs. 7.2%, $p = 0.039$). However, no significant difference was observed between the two samples in terms of the proportion of paying for sex during the previous six months. The prevalence was 6.0% for the Internet sample and 5.6% for the community sample ($p = 0.760$).

With regard to the prevalence of exchanging sex for money, no significant differences emerged between the two samples. About 10.7% of the community sample reported having had sex with males in exchange for money during the past six month, and the prevalence was 8.1% for the Internet sample.
After controlling for demographic characteristics, multivariate analysis indicated no significant differences in commercial behaviors between the two samples. (Table 4.3 8)

Drug use

The prevalence of illegal drug use in both samples was low. Less than 1.7% of both samples reported any illicit drug use and no differences were observed ($p = 0.820$). (Table 4.3 7)

STD history

As shown in Table 4.3 7, the prevalence of STD history reported by the Internet sample was significantly higher than that reported from the community sample. Nearly 30% of the Internet participants reported having been told by health professionals that they had been infected with any sexually transmitted disease(s), whereas there were only 10% in the community sample. Logistic analysis indicated that men recruited from the gay venues were significantly less likely to have a STD history than men recruited on the Internet ($AOR 0.25, CI 0.17-0.36, p < 0.001$) (Table 4.3 8).
### Table 4.3 Differences in selected characteristics between two samples, 2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>Community (n = 642)</th>
<th>Internet (n = 585)</th>
<th>p *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchanging money for sex</td>
<td>46</td>
<td>61</td>
<td>0.039</td>
</tr>
<tr>
<td>Exchanging money for sex in the past six months</td>
<td>36</td>
<td>35</td>
<td>0.760</td>
</tr>
<tr>
<td>Exchanging sex for money</td>
<td>80</td>
<td>82</td>
<td>0.311</td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months</td>
<td>68</td>
<td>46</td>
<td>0.134</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>11</td>
<td>9</td>
<td>0.820</td>
</tr>
<tr>
<td>STD history</td>
<td>65</td>
<td>171</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Syphilis</td>
<td>18</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>47</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>7</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Non-specific genital ulceration</td>
<td>13</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Genital warts (HPV)</td>
<td>19</td>
<td>63</td>
<td>-</td>
</tr>
<tr>
<td>Genital herpes</td>
<td>16</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

*p* Pearson Chi square test
Table 4.3 Differences between community and Internet samples after controlling for age, education, marriage, occupation and sexual orientation: A logistic regression analysis

<table>
<thead>
<tr>
<th>Key risk indicators</th>
<th>Community</th>
<th>Internet</th>
<th>AOR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Having sex with females in the past six months</td>
<td>159</td>
<td>24.8</td>
<td>93</td>
<td>16.9</td>
<td>2.01</td>
</tr>
<tr>
<td></td>
<td>1.22-3.30</td>
<td>0.006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having sex with males in the past six months</td>
<td>629</td>
<td>98.0</td>
<td>520</td>
<td>90.0</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>2.95-13.27</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UAI in the past six months</td>
<td>406</td>
<td>70.7</td>
<td>353</td>
<td>67.1</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>0.73-1.43</td>
<td>0.905</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having ≥6 male sexual partners in the past six months</td>
<td>360</td>
<td>57.1</td>
<td>117</td>
<td>22.1</td>
<td>4.88</td>
</tr>
<tr>
<td></td>
<td>3.51-6.80</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking sex on the Internet</td>
<td>388</td>
<td>60.6</td>
<td>517</td>
<td>88.8</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>0.20-0.47</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking sex in traditional gay venues</td>
<td>465</td>
<td>73.0</td>
<td>135</td>
<td>23.5</td>
<td>6.35</td>
</tr>
<tr>
<td></td>
<td>4.55-8.87</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paying for sex in the past six months</td>
<td>36</td>
<td>5.6</td>
<td>35</td>
<td>6.0</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>0.64-2.27</td>
<td>0.569</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchanging sex for money in the past six months</td>
<td>68</td>
<td>10.7</td>
<td>46</td>
<td>8.1</td>
<td>1.48</td>
</tr>
<tr>
<td></td>
<td>0.87-2.54</td>
<td>0.150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STD history</td>
<td>65</td>
<td>10.3</td>
<td>171</td>
<td>29.7</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>0.17-0.36</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * Referent group for the calculation of the AOR.

Odds ratio, 95% CI and p value from multivariate model after controlling for age (≥ 31 vs. ≤ 30), education (college and over vs. high school and less), occupation (students vs. others), marriage status (married vs. single) and sexual orientation (homosexual vs. other).
4.3.3 Differences in the use of gay websites and traditional gay venues

Use of gay websites

Data about the use of gay websites are presented in Table 4.3. Almost the entire Internet sample (97.7%) reported having visited a gay website before participating in the online survey, whereas approximately 64% of the community sample reported having visited a gay website prior to the Interview ($p < 0.001$).

Of those who visited gay websites in both samples, most had sought sexual partners through the Internet. No significant difference was observed between the two samples (community 94.2% vs. Internet 90.0%, $p = 0.067$). However, the number of male partners met through the Internet in the previous six months among those seeking sex online differed significantly between the two samples. Participants in the community sample were more likely to have a higher number of online male partners than participants recruited through the Internet ($mean \pm SD$: 8.3 ± 10.6 vs. 5.3 ± 9.3). The community sample appeared to have a higher proportion of having more than six partners (43.8% vs. 22.5%).

With regard to the prevalence of condom use with last partner met through the Internet, it was significantly lower in the Internet sample than in the community sample (52.9% vs. 73.9%).

Use of traditional gay venues
As shown in Table 4.3 9, most of the community sample (92.3%) had visited traditional gay venues before the interview, while only about half of the Internet sample (51.0%) had visited such venues. Of those who sought sex in traditional gay venues, 79.1% from the community sample reported having sought sexual partners in such venues and the proportion was about 45.6% in the Internet sample.

Among those who had visited traditional gay venues in both samples, the number of male sexual partners met in such venues during the past six months for the community sample was significantly higher than that of the Internet sample (mean ± SD: 9.3 ± 12.1 vs. 4.3 ± 9.2). Among them, over 46.2% of the community group had had >6 male sexual partners in the past six months while it was only about 16.8% in the Internet sample.

With respect to the prevalence of condom use with the last partner met in traditional gay venues, participants recruited from gay venues were more likely to use a condom than men recruited through the Internet (61.7% vs. 49.2%).

Overlap between two samples

As shown in Table 4.3 8, logistic analyses indicated that the community sample was more likely to seek sexual partners in traditional gay venues (AOR 6.35, CI 4.55-8.87, p < 0.001) and less likely through the Internet (AOR 0.31, CI 0.20-0.47, p < 0.001) than the Internet sample. However, there was a significant overlap between the community and the Internet participants in terms of venues where they met sexual partners (Table 4.3 10). Using the total number of participants as the denominator, 64% of the community sample visited gay websites and 62.5% had sought sexual partners through
Chapter four: Differences between Internet and community samples of MSM

the Internet; 51.0% of the Internet sample also visited gay venues and 26.0% had met sexual partners there. About 38.0% of the community and 24.6% of the Internet sample met sexual partners both on the Internet and in traditional gay venues.

Multivariate analyses were performed to compare the differences in UAI and the number of male partners by dividing participants into three groups: seeking sex both on the Internet and in traditional gay venues, seeking sex on the Internet only and seeking sex in gay venues only. After controlling for age, education, marriage status, occupation and sexual orientation, participants from the two samples still showed significant difference in the number of male sexual partners during the past six months. Compared with those who sought partners on the Internet only (Internet sample), those who sought sex only in traditional gay venues (community sample) were sixteen times more likely to have ≥ 6 male partners during the past six months (AOR 16.01; CI 8.64, 29.68; p < 0.001). Even for those who sought sex both on the Internet and in traditional gay venues, participants in the community sample were nearly three times more likely to have ≥6 male partners during the past six months than those in the Internet sample (AOR 2.76; CI 1.55, 4.89; p = 0.001). No significant differences in the prevalence of UAI emerged among the three groups. (Table 4.3 11)
### Table 4.3 Differences in the use of the Internet and traditional gay venues between the Internet and community samples, 2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>Community (n = 642)</th>
<th>Internet (n = 585)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiting gay websites before interview</td>
<td>414 64.5</td>
<td>571 97.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Seeking sex on the Internet</td>
<td>388 94.2</td>
<td>517 90.0</td>
<td>0.067</td>
</tr>
<tr>
<td>Number of sexual partners met through the Internet in the past six months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>17 4.5</td>
<td>50 11.3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>48 12.7</td>
<td>91 19.5</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>148 39.1</td>
<td>202 45.6</td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td>83 21.9</td>
<td>60 13.5</td>
<td></td>
</tr>
<tr>
<td>≥11</td>
<td>83 21.9</td>
<td>40 13.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Condom use with last male sexual partner met through the Internet</td>
<td>275 73.9</td>
<td>247 52.9</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Visiting traditional gay venues</td>
<td>590 92.3</td>
<td>297 51.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Sex seeking in traditional gay venues</td>
<td>465 79.1</td>
<td>135 45.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Number of sexual partners met through traditional gay venues in the past six months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>12 2.7</td>
<td>36 30.3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>50 11.0</td>
<td>25 20.0</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>182 40.2</td>
<td>38 31.9</td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td>115 25.4</td>
<td>12 10.1</td>
<td></td>
</tr>
<tr>
<td>≥11</td>
<td>94 20.8</td>
<td>8 6.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Condom use with last male sexual partner met in traditional gay venues</td>
<td>277 61.7</td>
<td>60 49.2</td>
<td>0.013</td>
</tr>
</tbody>
</table>

* Pearson Chi square test
Table 4.3 10 Places of sex seeking by community and Internet samples

<table>
<thead>
<tr>
<th>Places of sex seeking</th>
<th>Community</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>In gay venues only</td>
<td>230</td>
<td>37.5</td>
</tr>
<tr>
<td>On the Internet only</td>
<td>150</td>
<td>24.4</td>
</tr>
<tr>
<td>Both in gay venues and on the Internet</td>
<td>234</td>
<td>38.1</td>
</tr>
</tbody>
</table>

Table 4.3 11 High risk sexual behavior of community and Internet samples by venues of sex seeking, 2006

<table>
<thead>
<tr>
<th>Key sexual behaviors</th>
<th>In traditional gay venues only</th>
<th>On the Internet only</th>
<th>OR; 95% CI; p b</th>
<th>AOR; 95% CI; p c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community sample</td>
<td>Internet sample a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>UAI during anal sex in the past 6 months</td>
<td>131</td>
<td>71.6</td>
<td>223</td>
<td>65.2</td>
</tr>
<tr>
<td>≥ 6 male sexual partners in the past 6 months</td>
<td>130</td>
<td>56.8</td>
<td>44</td>
<td>12.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key sexual behaviors</th>
<th>Both in traditional gay venues and on the Internet</th>
<th>OR; 95% CI; p b</th>
<th>AOR; 95% CI; p c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community sample</td>
<td>Internet sample</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>UAI during anal sex in the past 6 months</td>
<td>164</td>
<td>72.9</td>
<td>95</td>
</tr>
<tr>
<td>≥ 6 male sexual partners in the past 6 months</td>
<td>177</td>
<td>77.0</td>
<td>66</td>
</tr>
</tbody>
</table>

a Reference group
b OR, Odds ratio; 95% CI, 95% Confidence Interval; AOR, Adjusted Odds ratio.
c After controlling for age (≥ 31 vs. ≤ 30), education (college and over vs. high school and less), occupation (students vs. others), marriage status (married vs. single) and sexual orientation (homosexual vs. other).
4.4 DISCUSSION

Although an increasing amount of research has been conducted using the Internet instead of traditional paper-pen surveys in gay communities as a medium to collect behavioral data among the MSM population [38, 89, 109, 122, 156], few studies have been conducted to explore the differences between samples recruited in the two ways [109, 115, 122]. This study firstly compared two self-selected convenience MSM samples in China—the largest developing country in the world with a huge MSM population and a unique traditional Chinese culture [60]. Survey results showed that the Internet and community samples in Harbin were significantly different in demographic characteristics and some risk sexual behaviors while shares some similarities.

4.4.1 Demographic characteristics

Compared with the community sample, the participants of the Internet sample were significantly younger and more educated with a higher proportion of students. This finding is consistent with the “early adopter” profile indicated by studies on new media adopters in the USA, which suggest that adopters of new technologies tend to be younger, upscale and better educated than non-adopters [43]. Although China is experiencing a rapid increase in Internet use, the penetration of the Internet is low and Internet development is still at an early stage. It is likely that young and well educated MSM, especially students, possess more computer literacy or have more ready access to personal computers than the older MSM in China [91].

Compared with the three studies conducted in the UK, the USA and Sweden, our study showed opposite results, that is the Internet sample was more educated than the
Chapter four: Differences between Internet and community samples of MSM

community sample [18, 104]. This may reflect the differences in computer and technical development between China and developed countries, in which educational level and low income are still important factors for Chinese people in determining access to the Internet [127]. China is experiencing a rapid increase in the use of the Internet with 137 million Chinese citizens regularly accessing the Internet at least one hour per week in 2006 [25]. However, Internet technology is more prevalent in large metropolitan areas. The 137 million Internet users only account for about 10.5% of the total 1.3 billion population [168]. Lack of computer skills, low income and low level of education are still the main barriers to Internet access. In Chapter 3, it has been observed that nearly 40% of the online sample accesses the Internet mainly in Internet cafes, which are not heavily used in developed countries. Use of Internet cafes, which is very cheap (0.25US$ per hour), is affordable for young MSM in China.

Compared with the community sample, the Internet sample is also less likely to identify themselves as homosexual and more likely to be bisexual. This finding is consistent with the results from the USA Swedish and UK studies [109, 115, 169]. Several factors might explain this difference between Internet and community samples. MSM who congregate in traditional venues where they encounter others for male-male sex might more strongly self identify as ‘gay’. On the other hand, the anonymous and relatively confidential nature of the Internet may be particularly attractive for bisexual MSM because going out in traditional gay venues may potentially have more serious consequences for bisexuals than homosexuals [122]. In addition, some MSM in the Internet sample are young and have no clear understanding of homosexuality. Results from this study showed that 9.8% of the Internet sample reported they could not decide, or did not know their sexual
orientation while it was only 2.4% for the community sample. However, no direct information was collected in this study to interpret this difference and this merits further investigation.

**4.4.2 Internet and community sample: who is at higher risk for HIV?**

Although several studies have compared behavioral differences between Internet and community MSM samples in developed countries, there is still no clear conclusion of whether the online MSM population is at higher risk for HIV than the community MSM population. A London study showed that online samples were more likely to report UAI with a partner of unknown or discordant HIV status [101]. The Swedish and USA studies indicated no significant differences in terms of UAI and numbers of sexual partners between the two samples [17, 170]. Another British study compared a convenience sample of men recruited through the Internet with MSM drawn from a national probability survey, which showed no significant difference between the two samples on a range of demographic and behavioral characteristics except that men in the Internet sample were more likely to report a STD infection in past year, anal intercourse and slightly more likely to have had UAI in the past six months (45% vs. 37%, $p = 0.064$) [81]. Our findings, however, show that participants in the community sample carry higher risk for HIV infection and transmission than those in the Internet sample.

*Having sex with both males and females*

Our findings show that the community sample was more likely to have sex with females than the Internet sample. It is assumed that the higher proportion having sex with females in the community sample is due to the older age and greater likelihood of being
married. However, after controlling for age, marriage, student status, education and sexual orientation, the difference between two groups were still significant. Unfortunately no direct information was collected in this survey that can be used to interpret this difference. Further research will be necessary to identify and understand heterosexual behaviors among the Chinese MSM population.

The significance of having sex with females for HIV transmission as well as possible reasons for heterosexual behavior among Chinese MSM have been discussed in Chapter 3. Having sex with both males and females may increase the likelihood of transmitting HIV from the risk group of MSM to their female partners and then to the general population [109, 115, 171]. A study conducted in six US cities has indicated that MSM who also have sex with women are more likely to have UAI with men and are at higher risk for HIV infection and transmission than men who have sex only with men [139]. Therefore, our findings potentially indicate that the community MSM may present a more significant bridge of HIV transmission to women than the Internet MSM.

**Number of male sexual partners**

The community sample reported a significantly higher number of male sexual partners in the past six months than the Internet sample. Almost all men in the community sample had had male-male sex in the past six months compared with 90% of the Internet sample. Among those who had same-gender sex in the past six months, the median number of male partners was seven for the community sample, which was significantly higher than the three partners of the Internet sample. After controlling for potential confounders, the community sample was nearly five times more likely to have ≥ 6 male
partners during the past six months than the Internet sample, and those seeking sex in
gay venues only were 16 times more likely to have ≥ 6 male partners than those seeking
sex in the Internet only.

The number of male partners during the past six months for the Internet sample in this
study is comparable to the number reported by participants from other provinces
according to our 2006 and 2007 national online surveys described in Chapter 3.
However, the number of male partners reported by the community sample was higher
than some other community-based surveys in China. A recent published study, which
recruited MSM from gay bars and volunteer activity venues in six Chinese cities,
showed that the median number of male partners in the past six months was three (mean,
5.7) [139]. A survey conducted in Beijing in 2006 which recruited participants through
Internet advertising, community outreach and snowballing showed the median number
was two [122]. Another community-based survey conducted in two cities from Sichuan
Province showed the convenience sample had a median number of 4.5 male partners in
the past six months [109]. The difference in the number of male partners between our
community survey and others could be due to different recruiting methods. Most of the
other behavioral surveys used mixed recruitment methods including through personal
networks and advertising on the Internet. In our community survey, participants were
specifically recruited from cruising areas, such as gay bars and public bath houses,
where men congregated specifically to seek partners. Therefore, it is likely that men
included in our sample are likely to be at the higher end of the spectrum of risk behavior
and have a high turnover of partners. This difference could also indicate that the
community group of MSM in Harbin is more sexually active than the MSM in other studies. Further research is necessary to substantiate these speculations.

Gay venues have historically been important places for men to seek sexual partners and in recent years the Internet becomes widely used place, especially for young MSM. Therefore it is likely that the community sample has a higher number of male partners than the Internet sample. The community sample may represent individuals of great interest to HIV prevention programs.

**Unprotected anal intercourse**

Among those who had male-male sex in the past six months, our results suggest that the Internet sample tended to have a lower condom use. Men in the community sample were significantly more likely to always use condoms and less likely to never use a condom. When having sex with the last partner met through the Internet or in traditional gay venues, the Internet sample also showed lower condom use consistency than the community sample. However, no significant differences in the overall level of UAI between the two samples were observed after controlling for potential confounders such as age, marriage status, student status, education and sexual orientation. About 70% of the two samples had UAI in the past months when having sex with males.

Three factors might contribute to this difference. First, in the multivariable analysis, UAI was defined as the number of participants who did not always use condoms when having sex with males divided by the total number of all participants. Because the Internet sample had a higher proportion of participants who reported having no male-male sex in the past months than the community sample (10.0% vs. 2.0%), the difference in condom
Chapter four: Differences between Internet and community samples of MSM

use consistency could be diluted by the disproportion of having sex with males even though the Internet sample was less likely to use condoms consistently.

Second, the indicator of UAI used in this study does not distinguish between regular and non-regular partners, but gives an indication of overall levels of protected and unprotected anal sex. In addition, information on the extent of knowledge about HIV sero-status of their partners was not collected. Provided that there are disproportionate participants who choose not to use condoms within stable partnerships and use condoms in any sex with other partners, or not to use condoms with partners of whom they know their HIV sero-status, the increased UAI for any of the two sample may represent no/little increased risk of HIV transmission [115]. Many studies have also shown that the condom use consistency is higher in non-regular partnerships than regular partnerships[109, 115]. If non-use of condoms within stable partnerships is more common in any of the two study samples, the indicator of UAI used in this study may suggest higher levels of risk than that actually exists [122].

Third, the mode of survey completion may have potential impact on the reporting of UAI. The community sample was interviewed by interviewers and thus more likely to be influenced by social desirability bias than the Internet sample. Because unprotected anal sex is socially undesirable, the community sample may tend to over-report condom use, which leads an underestimation of UAI. The social desirability bias may also potentially contribute to the lower proportion having a STD history in the community than that from the Internet sample.
The prevalence of UAI observed in this study is similar to several other surveys among MSM in China. The survey conducted in six Chinese cities showed that 57.5% of men reported UAI when having anal sex with males in the past six months [109]. Two surveys conducted in Beijing showed that the prevalence of UAI in different partnerships ranges from 60% to 80% [123, 156]. Therefore, based on the findings of this study, we may conservatively conclude that there is no significant difference in the prevalence of UAI between the two samples.

**Other risk behaviors**

No significant differences in the proportions exchanging sex for money or exchanging money for sex were observed between the two samples. But the Internet sample reported significantly higher proportion having a STD history than the community sample. This is puzzling since it is apparent that the community sample is more likely to have a high number of male partners than the Internet sample. The social desirability bias caused by the face-to-face mode of data collection in the community survey may potentially contribute to an underestimation of history of STDs (socially undesirable for men to have a STD). Some other behavioral and social factors, such as alcohol abuse, depression, childhood abuse and discrimination, may also place MSM at increased risk for acquiring and transmitting HIV [156], but such information was not collected and this is a limitation of this study.

In summary, UAI and multiple partnerships are two important indicators for HIV behavioral surveillance among the MSM population. Most current intervention programs in this group aim both to decrease the overall number of partners and to increase condom
use in all partnerships. However, when the HIV prevalence is at a low level, such as in China, the spread of HIV among MSM through homosexual transmission relies much more on multiple partnerships than unprotected sexual behaviors [157]. Therefore, although no significant difference in the prevalence of UAI emerged between the two samples, the community sample is still at higher risk for HIV infection and transmission than the Internet sample in view of its higher proportion of having sex with females and higher number of male sexual partners.

4.4.3 Overlap between two samples

Compared with each other, the community sample was more likely to seek sexual partners in traditional gay venues and the Internet sample was more likely to seek sex using the Internet. This is not surprising since meeting men for sex is one of the most important reasons for cruising either in gay venues or visiting gay websites on the Internet [87, 156]. However, our findings indicate that there is a significant overlap between the two samples in terms of the preferred venues for seeking sexual partners. Around 64% of the community sample visited gay websites and 60% sought partners through the Internet. Over half of the Internet sample, on the other hand, frequented traditional gay venues and 24% had met sexual partners in such venues. Gay venues have emerged in China in the 1990s and continuously been important places for MSM to socialize [41]. In recent years, an explosion of online sex seeking activities has occurred among the Chinese MSM population. Two recent published studies show similar results that between 43% and 60% of MSM prefer seeking sexual partners through the Internet [16, 143].
However, among those who seek sexual partners both on the Internet and in traditional gay venues, participants recruited through the Internet differed from those in the community sample. Those in Internet sample were younger, had a higher education level, and were less likely to be homosexual than those in the community sample. After controlling for these variables, men recruited in the community were nine times more likely to have ≥ 6 male partners in the past six months than men recruited through the Internet.

**4.4.4 Implications for HIV/AIDS behavioral surveillance and health promotion among MSM in China**

The comparisons between the two samples are very important for the development of the HIV/AIDS behavioral surveillance strategy among the Chinese MSM population. Our findings indicate that at present the Internet MSM users in China represent a group of MSM who are different from those recruited in the traditional gay venues in various characteristics. The Internet sample was significantly younger, more educated and had a lower number of male partners than men in traditional gay venues [18, 87, 148, 154]. The current behavioral surveillance strategy among the MSM in China, which utilizes convenience sampling to sample in traditional gay venues, is affected by selection bias. Computer and Internet access has been increasing dramatically in China [41] and more MSM have been using the Internet to seek sexual partners, especially young and well educated MSM [89]. Thus, the Internet provides an important opportunity to gain access to a subpopulation of MSM who may not affiliate with the local gay community and may not frequent the traditional gay venues. Along with other advantages of online surveys, such as cost-effectiveness, speed of collecting data, limitless number of
respondents and reduction of bias in sensitive topics, the Internet may provide an expedient method to conduct behavioral surveillance and health promotion among MSM in the future. Data collected through this effort can be used to strengthen the national and local capacity to monitor the HIV epidemic and to develop, implement and evaluate HIV prevention programs in an Internet era.

4.4.5 Limitations

Limitations of this study should be acknowledged. Firstly, both the Internet and community samples are not probability-proportional samples. Because MSM who visit traditional gay venues and the Internet may specifically congregate to seek sexual partners, participants in both samples may represent those whose are likely to be at the higher end of the spectrum of risk behaviors. Our findings indicated that the two samples shared few similarities in terms of demographic characteristics and sexual behaviors. Therefore each of the two samples is not a representative sample of the Chinese MSM population and may represent different subgroups with a certain overlap. Selection bias associated with the community and Internet-based samples may exist and has been discussed in Chapters 2 and 3.

Secondly, there are differences between the Internet and the community surveys other than different recruitment methods. In the community survey, potential respondents were approached by peer recruiters and interviewed by interviewers, whereas in the Internet survey participants completed the online questionnaires by themselves. The observed differences between the two samples could be potentially influenced by the different survey modes. Variation in data among survey modes has been explored in
some studies. Some researchers provide evidence that the quality of an electronic survey is somewhat different from a paper and pen survey, specifically that electronic surveys have higher non-response rates [15]. Some believe that the anonymous and safe nature of the Internet may be helpful to illicit true information especially for sensitive sexual questions [18]. But other researchers argue that there are minimal differences between these two approaches [172]. It is difficult to quantify the impact of the two survey modes. The social desirability bias which exists in the community survey may potentially lead to an overestimation of numbers of male sexual partners (socially desirable for men to over-report number of sexual partners) and underestimation of UAI and STDs (socially undesirable). However, according to the results, there are significant differences between the Internet and the community samples in demographic characteristics and risk behaviors. These differences are unlikely to be due to an increased willingness to report risk behaviors in a Web-based survey because of its perceived anonymity and confidentiality or due to the social desirability.

4.5 CONCLUSION

In conclusion, there are significant differences in demographic characteristics and sexual behaviors between the Internet and the community samples of men who have sex with men in Harbin. Compared with the community sample, men recruited through the Internet are significantly younger, more educated and more likely to be students. The community sample is at higher risk for HIV infection than the Internet sample in view of its higher number of male sexual partners in the past six months although no significant difference in the prevalence of UAI was observed between the two samples. These findings indicate that the online MSM population in China may represent a different
Chapter four: Differences between Internet and community samples of MSM

sub-population of MSM from those cruising in traditional gay community. The current surveillance results based on samples from traditional gay venues may overestimate the MSM population’s risk of HIV. The Internet may provide a medium to gain access to a subpopulation of MSM who may not affiliate with the local gay community. Using the Internet as data collection method may be cost effective and may serve as an additional mechanism for the existing gay venue-based behavioral surveillance system. Data collect through this effort can be used to strengthen the national and local capacity to monitor the HIV epidemic and to develop, implement and evaluate effective HIV prevention programs in the Internet era.
CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS
This thesis explored the trends in risk behaviors and HIV prevalence among MSM using traditional community-based surveys and Internet surveys, and described the importance of web-based behavioral surveillance among MSM by comparing the differences between Internet and community-based MSM samples. Findings from this study provide insights for future HIV/AIDS behavioral surveillance, epidemic estimation and prediction as well as health promotion and intervention among the Chinese MSM population.

5.1 KEY FINDINGS OF THIS STUDY

This thesis studies the background characteristics, sexual behaviors and sex-seeking practices of the Chinese MSM population using the Internet and traditional gay-venue based surveys. The main findings are as follows.

5.1.1 Men who have sex with men are a vulnerable group to HIV infection in China.

Men who have sex with men in China are at high risk for HIV transmission because of their high rate of UAI, high numbers of male sexual partners and misconceptions about HIV/AIDS transmission and inconsistent condom use despite indications of improvements over time in a number of these measures.

- Based on the three community-based surveys, although there was a trend towards a reduction in the rate of never using a condom and an increase in the rate of always using condoms during anal sex in the past six months among MSM in Harbin, the prevalence of unprotected anal intercourse (UAI) was still high (from 90% in 2002 to 72% in 2006).
Chapter five: Conclusions and recommendations

- Based on the community-based surveys, most participants are sexually active with a high proportion having multiple sexual partners: 86.5% in 2002, 76.0% in 2004 and 91.6% in 2006. A potential increase in the number of male sexual partners was observed from 2002 to 2006. The proportion of men having anal sex with multiple partners (≥ 2) in the past six months in 2006 was significantly higher than that in 2002 and 2004. There is no sign of any delayed sexual initiation. The median age of first sex was around 17 years old with around 5% having first sex at the age of less than 14 years old.

- Based on the 2006 online survey, less than half of the gay website users were at little or no risk for HIV infection. These participants either had no anal sex or always used a condom during anal sex in the past six months. More than 56% had UAI in the past six months.

- Although most respondents demonstrate a high level of basic knowledge about the risk of HIV transmission, there are still a substantial number of MSM with misconceptions about condom use and HIV transmission.

5.1.2 The sexual behavior of MSM has potential implications for both men’s and women’s health.

- Although a trend has been observed among MSM in Harbin towards more self-identifying as homosexual (from 58% to 80%) and more living with a male partner (from 12% in 2002 and 41% in 2006), about one fifth report that they are bisexual and 23.2% report having had sex with women in the past six months.
Chapter five: Conclusions and recommendations

- The online surveys showed similar results with 14% to 17% currently married and approximately 17% (16.3% in 2006 and 17.3% in 2007) having had sex with females in the past six months.

5.1.3 The type of partnerships plays an important role in determining condom use.

- The type of partnership plays an important role in determining consistent condom use. An increase in consistent condom use was observed in the 2007 online survey from 24% with regular partners, to 42% with non-regular partners, to 46% with clients and 65% with male sex workers.

5.1.4 Trust, unavailability and dislike of condoms are main barriers to condom use.

- MSM most frequently report trusting their partners as the main reason for not using a condom with a regular partner.

- The lack of availability of condoms appears not to be an important barrier to condom use. However, the spontaneous nature of sexual encounters with non-regular partners in which condoms are not accessible appears to be a significant barrier to condom use.

- Dislike of condoms, which reflects perception that condoms reduce pleasure and sensation, plays an important negative role in condom use across different partnerships.

5.1.5 Having a regular partner may reduce risk of HIV infection

- Gay website users who have regular partners are at lower risk for HIV infection
and transmission than those who do not. They are less likely to have sex with females, less likely to have multiple partners and less likely to engage in commercial sex behaviors.

- However, among those who had regular partners during the past six months (online sample), 38.5% also had non-regular partners at the same time and less than half of these consistently used condoms when having anal sex with non-regular partners. Additionally, 9.5% also had sex with paid partners and 5.1% had sex with clients in exchange for money. The prevalence of consistent condom use in both situations was low.

5.1.6 The Internet has become a risk environment for HIV transmission

- The Internet has become a widely used meeting venue for Chinese men who have sex with men. The majority of gay website users have used the Internet to seek sex and meeting sexual partners on the Internet is one of the most common reasons for visiting gay websites. Chinese gay website users are vulnerable to HIV/AIDS given their high prevalence of unprotected anal intercourse and the multiple male sexual partners they may find from the Internet.

5.1.7 Young and well educated MSM account for the majority of the MSM who use gay websites

- Approximately 80% of the online respondents were less than 30 years old and more than 75% had a tertiary education or higher among the online sample.
5.1.8 There are significant differences between the Internet and community samples of MSM

- Compared with the community sample of MSM in Harbin, the Internet sample was significantly younger, more educated and more likely to be students and self-identify as homosexual.

- After adjusting for differences in demographic characteristics, the community sample was two times more likely to have had sex with females and nearly five times more likely to have had ≥ 6 male partners in the previous six months than the Internet sample (46.1% vs. 20.2%). The mean number of male partners for the community sample was 13.5 ± 16.8, whereas it was 6.0 ± 12.2 for the Internet sample.

- Among those who had engaged in anal sex in the previous six months, the Internet sample tended to use condoms less consistently than the community sample. However, using the total sample size of each sample as the denominator to calculate UAI, no significant difference in the prevalence of UAI between the two samples was observed after controlling for age, education, marriage, student status and sexual orientation.

- No significant difference was observed between the two samples in the proportion of those exchanging sex for money, exchanging money for sex or the prevalence of illicit drug use.

- The community sample was more likely to seek for sexual partners from
traditional gay venues, while the Internet sample was more likely to seek sex using the Internet. However, there was a significant overlap between the two samples in terms of the preferred venues for seeking sexual partners. About 60.6% of the community sample had sought sexual partners through the Internet and 23.5% of the Internet sample had met sexual partners in traditional gay venues.

5.1.9 Traditional gay venues play an important role in sex seeking. MSM who seek sex in traditional gay venues are at higher risk for HIV infection than online MSM.

- Although seeking sex on the Internet is popular among the online MSM population, traditional gay venues still play an important role in the sex seeking process, especially for MSM who are older and less educated.

- Based on the 2006 and 2007 online surveys, compared with those who seek sex on the Internet only or in other ways, MSM who seek sexual partners both in traditional gay venues and on the Internet have a higher turnover of male partners and a lower rate of consistent condom use, and thus are at higher risk for HIV infection and transmission (Table 3.315).

- The comparison between the community and the Internet samples in Harbin also shows that participants who sought sex only from traditional gay venues (community sample) were sixteen times more likely to have had ≥ 6 male partners during the previous six months than those who sought partners on the Internet only (Internet sample), after controlling for age, education, marriage, student status and sexual orientation.
5.1.10 The prevalence of injection drug use is low among the Chinese MSM population

- Few respondents from the community-based surveys reported having injected illegal/non-medical drugs. The prevalence of injecting drug use decreased from 6.1% in 2002 to 0.2% in 2006.

- The prevalence of illicit drug use appears to be low as well among Chinese gay website users. Fewer than 4% of the overall sample reported any illicit drug use and injecting drug use was extremely low. No regional differences in drug use are observed. Male-male sex appears to be the main HIV transmission mode among the Chinese MSM population.

5.1.11 The HIV prevalence among MSM in Harbin remains low.

- The HIV prevalence (2.2%) among MSM in Harbin in 2006 was higher than that in other study years (1.3% in 2002 and 0.94% in 2004), but no statistically significant change was detected. The HIV prevalence remained at a low level in this specific population over the study period.

- A relative high proportion of MSM who reported having a STD history was observed both in the community and the Internet based surveys.
5.2 SIGNIFICANCE OF THIS THESIS

The study of HIV/AIDS among MSM in China has been relatively neglected and only in recent years has MSM-specific programming been funded by the government, international organizations and non-governmental organizations. The coverage of HIV/AIDS behavioral surveillance among MSM in China could not meet the requirements for public health practice and disease prevention as the current approach is expensive and time consuming. In this study diverse groups of MSM were reached and quantitative data on risk behaviors were collected. Despite the limitations of these surveys as discussed in previous chapters, the study results have made an important contribution to the epidemiology of HIV risk among the Chinese MSM population.

Surveillance data that track trends in risk behaviors and HIV prevalence are rare in China. This thesis fills the gap in this area by exploring the trend in risk behaviors in combination with HIV prevalence data albeit with a relatively short period. Data collected can be used to inform HIV/STIs planning and evaluation of intervention strategies and improve the estimation and prediction of the HIV/AIDS epidemic among MSM.

The online surveys in this study are the first attempt to systematically explore MSM’s risk behaviors online and use of the Internet for sexual purposes among the Chinese MSM population. They provide valuable information on demographic characteristics, sexual behaviors and sex seeking practices on the Internet and in traditional gay venues among gay website users. It substantiates the finding reported in developed countries that the Internet is a new meeting place for MSM. The study results also provide a new
approach for risk behavior surveillance among the Chinese MSM. This has important policy implications for HIV control and prevention in an Internet era as the Internet has become an emerging risk environment for HIV transmission.

The findings of extremely high risk sexual behaviors among gay website users, particularly in gay men who seek sex both online and offline, will provide valuable baseline data for future program evaluation. This is also the first report to describe geographical differences in drug use for Chinese gay website users. This thesis has the potential to guide the development of appropriately targeted preventive activity for MSM in China.

The finding of different levels of condom use within various partnerships provides valuable evidence to improve the design the HIV/AIDS risk behavior surveillance among MSM in China. The reasons for not using condoms during anal sex reported in this thesis also are of importance for condom promotion in China.

This thesis is the first study to examine the difference in demographic characteristics and risk behaviors between an Internet and community based sample of MSM in China. The finding that the community sample of MSM carries higher risk for HIV infection has significance for improvement of HIV surveillance approaches among MSM in China. Countries other than China can also take advantages of the findings from this study in designing behavioral surveillance among MSM.

The results of this thesis may also have policy implications for HIV risk reduction among the Chinese MSM population. Specific recommendations, based on these findings, are presented as follows.
5.3 IMPLICATIONS AND RECOMMENDATIONS

Findings from this study demonstrate that China is facing an emerging HIV/AIDS epidemic in the MSM population despite low prevalence of HIV. By addressing the challenges in understanding of MSM’s risk for HIV in China, this study provides public health implications and recommendations as follows.

(1) Recognition of risk behavior for HIV transmission and of the need for HIV/AIDS surveillance among MSM in China

Although several formal reports issued by the Chinese government and governmental funded institutions have acknowledged MSM as a vulnerable group requiring specific interventions, more public investment is needed to deal with HIV/AIDS at multiple levels given the high level of risk behaviors among the Chinese MSM population:

- Public sector officials at all levels need to acknowledge MSM as a vulnerable group requiring specific interventions. More political support and commitment of resources should be provided for prevention and intervention actions in this population.

- MSM should be included as a risk group in national HIV sentinel and behavioral surveillance and the coverage of surveillance for this specific group should be expanded to better understand patterns of HIV/STI infection.

- Surveillance results should be better collated, managed, analyzed, and disseminated to government and non-government organizations and people who
need, such as CDCs, government departments, gay organizations, researchers, in order to efficiently assess needs, plan responses, and evaluate outcomes.

(2) The Internet, a possible and practical medium for behavioral surveillance and health promotion among MSM

Behavioral surveillance

Our study has demonstrated that it is feasible to conduct HIV/AIDS behavioral surveys through Internet-based questionnaires among MSM in China. The wide use of gay websites among the Chinese MSM population ensures that the Internet provides an excellent platform to access a large number of MSM across geographical and cultural boundaries. Compared with the current behavioral surveys among MSM in China, which recruit participants from traditional gay venues using a convenience sampling strategy, the Internet-based surveys offer a number of advantages: 1) Internet–based surveys are relatively inexpensive. 2) They provide numerous potential respondents and shorten the time from research questions to answers. 3) They protect the privacy of the respondents and avoid the embarrassments of a traditional survey. Therefore, the advantages provided by Internet-based surveys seem to be able to solve some common challenges facing by the current behavioral surveys among MSM in China. In addition, significant differences in risk behaviors between the Internet and community sample of MSM have been observed from this study. These findings described above suggest that Internet-based HIV/AIDS behavioral surveillance among MSM should be developed in China. The Internet may serve as an additional venue for existing venue-based behavioral surveillance system. Data collected through this endeavor can be used to better reflect
Chapter five: Conclusions and recommendations

the HIV risk of MSM by capturing a different population, strengthen the national and local capacity to monitor the HIV epidemic and to develop, implement and evaluate HIV prevention programs in an Internet era.

**Health education and promotion**

The Internet has become an emerging risk environment for Chinese MSM, and intervention programs should be put where the risk is. Because most HIV/AIDS intervention programs in China are carried out in gay venues, a significant proportion of online MSM including those who are socially and geographically isolated have little contact with current health promotion and intervention programs. MSM-specific programs are available to only the most visible MSM populations. Using the Internet as a mode for health education and promotion is an appealing method to access a previously hidden group who cannot be reached using a conventional gay-venue-sampling method. Therefore, an online education and promotion program should be part of an educational strategy for the MSM population. Of course, there are important methodological considerations to this approach. What are MSM’s attitude to online health promotion? Do Internet interventions work? What is the quality of information available online? What methods can be used-offering passive information system on the website, or interactive approaches such as chat rooms and bulletin boards, a combination of these methods or other approaches? Obviously more research is needed to answer these questions.

*(3) Reducing stigmatization and discrimination of homosexuals and creating a more tolerant society to MSM*
In recent years, the emergence of gay organizations, gay websites, and public gay meeting places in China has allowed MSM to meet together and organize their own activities. A gradual opening of legal policies and growing tolerance of homosexuality by the government and society have allowed MSM to be openly gay. This study has indicated that MSM increasingly identify themselves as homosexual and more are living with a male partner. In addition it has been found that MSM who have a regular partner carry lower risk sexual behaviors for HIV/STI than others. Because stigma and discrimination can foster invisibility and increase vulnerability, more efforts should be taken at various levels to create a tolerant society to MSM. First, social support and commitment will be needed to de-stigmatize homosexual behaviors and reduce discrimination against gays in China, such as by addressing homosexuality as a matter of personal choice. Second, more activities should be conducted to examine the personal life of MSM and to legalize activities, such as i) providing dating services to help gay men to look for serious relationships; ii) providing counseling and emotional support to help gay people maintain their male-male relationships; iii) providing psychological counseling for gay men to deal with the pressure from their families, such as the pressure of getting married or "coming out".

(4) Evaluating high-risk sexual behaviors by distinguishing between regular and non-regular partners

Findings of this study provide evidence to improve the selection of HIV/AIDS behavioral surveillance indicators among MSM in China. The increasing number of MSM who identify themselves as homosexual and live with a male partner as well as different condom use within partnerships addresses the need to evaluate their sexual
behaviors by distinguishing various partnerships. Information on UAI based on current surveillance among MSM in China is not able to provide such information. Provided that couples who know their sero-status and are sero-concordant choose not to use condoms within their regular partnerships and use condoms in any sex with other partners, the observed risk of HIV transmission may suggest higher levels of risk than actually exist, and may also understate the risk reduction over time. Therefore, this issue should be considered in the design of behavioral surveillance indicators among MSM in China.

(5) **Greater access to prevention and intervention services**

Although access to HIV prevention and intervention services were not evaluated in this study and it is difficult to connect any changes in risk behaviors with HIV intervention programs, surveillance results from this study have significant implications for HIV/AIDS intervention in this group.

**Education**

Knowledge about HIV/AIDS is an important prerequisite for behavior change, although knowledge does not necessarily lead to behavior change. Results show that MSM in China have preliminary knowledge about HIV/AIDS transmission. However, there are still a substantial number of MSM with misconceptions about condom use and HIV transmission. The relatively high level of misconceptions about condom use may raise an important public health concern. For those who have reported consistently using a condom during the past six months, were condoms used correctly and consistently during every single sexual contact? This reminds us that use of condoms may be not the
sole indicator of success of an HIV prevention program. Information, education and communication (IEC) interventions should be reinforced to increase the understanding of HIV/AIDS and reduce misconceptions that are disincentives to behavior change.

**Condom use**

Although condom use consistency is increasing under current intervention strategies, the prevalence of unprotected anal intercourse remains at a high level among the Chinese MSM. Compelling international evidence has been gathered that consistent use of male condoms is a highly effective method for preventing HIV transmission and MSM can be convinced to use condoms. Condom promotion needs to be intensified and scaled up sufficiently to curb the spread of HIV infection among MSM in China.

HIV prevention and condom promotion must overcome specific barriers to condom use in various sexual settings. Clear evidence has been documented that trust, unavailability and dislike of condoms are main barriers to using condoms. MSM most frequently report trusting their partners as the main reason they do not use a condom with a regular partner. The lack of availability of condoms appears not to be an important barrier to condom use. However, the spontaneous nature of sexual encounters with non-regular partners in which condoms are not accessible appears to be a significant barrier to condom use with non-regular partners. Dislike of condoms, which reflects the perception that condoms reduce pleasure and sensation, plays an important negative role in condom use across different partnerships. However, no direct information on sociological, behavioral and psychological factors associated with trust, unavailability and dislike of condoms, are collected in this study. In-depth qualitative studies to explore fundamental
reasons for not using condoms in different partnerships are needed to provide specific directions for condom promotions.

The type of partnership plays an important role in determining condom use. A gradual increase in consistent condom use was observed from sex between regular partners to sex between non-regular partners and to sex between commercial partners. High rates of condom use have been achieved at least for casual partners in some of the countries with high HIV infection rates. This plays a key role in the control of HIV although it has not invariably led to a demonstrable fall in the rate of HIV infection for various reasons. However, the HIV epidemic in China is concentrated in high risk groups and HIV prevalence among MSM remains relevant low. The current situation raises several questions. Is consistent condom use only with casual sexual partners enough to curb the spread of HIV in China? Findings of this study have shown that multiple partnerships and UAI with non-regular and commercial partners are common among those who are in a stable relationship. This indicates that condom use only with casual sexual partners is not enough. However, condom use in a steady relationship is a challenge. Trust, perceived low risk for HIV and power inequalities are common issues. How can high rates of condom use be achieved in steady sexual partnerships among MSM when HIV prevalence in this group and in the general population is low? Formative research that addresses these questions must be conducted.

(6) To scaled up interventions in traditional gay venues to meet the need

Although seeking sex on the Internet is popular among the online MSM population, traditional gay venues still play an important role in the sex seeking process, especially
for MSM who are older and less educated. They also have a higher turnover of male partners and a lower rate of condom use than those seeking sex on the Internet. This indicates that MSM who visit traditional gay venues are likely to be at the higher end of the spectrum of risk behaviors. Therefore, they may represent a group of greatest interest to HIV prevention programs. Gay-venue-based health promotion and behavioral intervention programs should be enforced and scaled up to meet the need for controlling HIV transmission in MSM in China.

(7) Continue surveillance is needed to monitor the trend in HIV prevalence among this group.

Although high risk sexual behaviors make the MSM population highly vulnerable to HIV/AIDS, the HIV prevalence among this population has remained at a relatively lower level, perhaps reflecting low levels injecting drug use in this population. The small overlap between drug users and MSM slows the spread of HIV from IDUs to MSM. This indicates that male-male sex may be currently the main HIV transmission mode for HIV among the Chinese MSM population. However, HIV/AIDS epidemics among MSM often develop under a veil of silence, unnoted except by their victims. A recent published study shows that the HIV prevalence among MSM in Beijing increased from 0.4% in 2004 to 5.2% in 2006. Given the high rate of UAI and high number of male sexual partners in this population, HIV infection rates will continually spread unless effective prevention measures are implemented. Continued close tracking of HIV prevalence among this population will be needed.
In conclusion, although the HIV prevalence remains at a relatively low level, China is facing an emerging HIV/AIDS epidemic among MSM given their low rate of condom use and high turn over of sexual partners. The Internet has emerged as a new risk environment for HIV transmission. HIV surveillance and prevention strategies should be adjusted to meet the need of curbing HIV transmission in an Internet era. Unless effective prevention strategies are implemented, HIV/AIDS will continually spread among the Chinese MSM population.
REFERENCE
REFERENCE


20. .


Reference


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159. Anonymous. **The Internet's role as modern bathhouse is being scrubbed. Online hookups increasingly popular among MSM.** AIDS Alert 2003,18(10):121-123.


Appendix A:
HIV/AIDS BEHAVIOURAL SURVEILLANCE SURVEYS (BSS)
—Community-based surveys among MSM, 2002–2006

G: Basic information (interviewer only)
G1 City name: __________________
G2 Name of the gay venue: ______________________
G3 Questionnaire Number: /___/___/___/___/
G4 Date of interview: /____/____/_____/ (MM/DD/YYYY)
G5 Interviewer’s code: /___/___/

A: Background characteristics
A1. What is your date of birth? /____/____/______/ (MM/DD/YYYY)
   (No response: 99-99-9999)
A2. What is the highest level of school you completed?
   1 Never
   2 Primary school not completed
   3 Primary school
   4 Secondary school
   5 High school
   6 College/University
   7 Post graduate or over
   8 Other (specify) ______________
   9 No response
A3. Do you have a job now (either full time or part-time)?
   1 Yes
   2 No
   9 No response
A4. What is your usual occupation?
   (What kind of work do you do most of your time?)
   1 Student
   2 Factory worker
   3 Office clerk
   4 Self-employed businessman
   5 Teacher or doctor
   6 Driver
   7 Soldier or policeman
   8 Farmer
   9 Clerk of entertainment establishments
   10 Other (specify) __________________
   11 Unemployed
   99 No response
Appendices

A5. What is your marital status?

1  Single
2  Married
3  Divorced
4  Separated
5  Widowed
6  Cohabiting
9  No response

A5a If you are currently in a cohabiting relationship with someone, your partner is:
(By a cohabiting partner we mean with whom you are currently living)

1  Male
2  Female
9  No response

A6. How long have you been living in this city?

/_____/ Years, /_____/ Months
(Since birth, ENTER 98, if less than one month, ENTER 00)

A7. Do you think of yourself as:

1  Heterosexual
2  Homosexual
3  Bisexual
4  Unknown
5  Other (Specify)________________________
9  No response

A8a. Please indicate whether you agree or disagree with the following statements.
(Y: Yes; N: No; NK: Do not know; NR: No response) [For the 2002 and 2004 surveys only]

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<thead>
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<th></th>
<th>Y</th>
<th>N</th>
<th>NK</th>
<th>NR</th>
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<td>A</td>
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<td>G</td>
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252
If a man withdraws before ejaculation or doesn’t ejaculate inside when having sex, then he will not transmit HIV to others.

A pregnant women infected with HIV can transmit the virus to her unborn child.

The condom should be kept unrolled before putting on a man’s penis.

Some space should be left at the top of a male condom for sperm.

A used condom can be reused after cleaning.

Cooking oils or Vaseline can be used for lubrication when using a condom.

A8b. Please indicate Yes or No of the following statements.
[Y: Yes; N: No; NK: Do not know; NR: No response][For the 2006 survey only]

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<tbody>
<tr>
<td>A</td>
<td>Can a healthy person have HIV?</td>
<td>Y</td>
<td>N</td>
<td>NK</td>
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<tr>
<td>B</td>
<td>Can a person be infected with HIV if using blood or blood products that are contaminated with HIV?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>C</td>
<td>Can a person be infected with HIV if sharing needles with people who are HIV positive?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>D</td>
<td>Can the risk of HIV transmission be reduced by using condoms correctly?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>E</td>
<td>Can the risk of HIV transmission be reduced by having sex with only one faithful, uninfected partner?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>F</td>
<td>Can a pregnant woman who is infected with HIV transmit the virus to her unborn child?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>G</td>
<td>Can a HIV infected woman transmit the HIV virus to her children by breast feeding?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>H</td>
<td>Can a person be infected with HIV by regular contacts with people who are infected?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>I</td>
<td>Can a person get HIV from sharing a meal with someone who is infected?</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>J</td>
<td>Can a person get HIV from mosquito bites?</td>
<td>1</td>
<td>2</td>
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B: Sexual behaviors
[The next questions are about your sexual behaviors. By sex we mean oral, vaginal, or anal sex, but not masturbation.]

B1. How old were you when you had your first sexual contact? That is, how old were you when you firstly did any of the following: oral, vaginal or anal sex?

Age: |   |   |   |
Don’t remember 98
No response 99
Appendices

B1a. Your first sexual partner was:

1  Male
2  Female
9  No response

B1b. During the past 12 months, have you had oral, vaginal or anal sex with any male partner?

1  Yes
2  No (Skip to END)
9  No response (Skip to END)

[Now I have some questions related to your sexual experience with females]

B2. During the past six months, with how many different women have you had sex?

[Oral sex, vaginal sex or anal sex]

Number of female partners: [___] [___] [___]
No female partners 000 (skip to B3.)
No response 999 (skip to B3.)

B2a. With what frequency did you use a condom when having vaginal or anal sex with all your female partners in the past six months? [Read out the answers]

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time
9  No response

[Now I have some questions related to your sexual experience with males]

B3. Now please think about how many different men have you had oral or anal sex with in the past six months? [That is both the number where you have been the insertive partner and the number where you have been the receptive partner.]

Number of male partners: [___] [___] [___]
No female partners 000 (Skip to B6.)
No response 999 (Skip to B6.)

B4. How often did you have anal sex with male partners where you were the insertive partner in the past six months? [Insertive sex means you put your penis into a partner’s anus]

1  Never (Skip to B5)
2  Less than once a month
3  About once a month
4  2-3 times a month
5  About once a week
6  2-3 times a week
7  More than 4 times a week
9  No response
B4a. How often did you have anal sex with male partners where you were the insertive partner in the past six months? [Insertive sex means you put your penis into a partner’s anus]

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time
9  No response

B5. How often did you have anal sex with male partners where you were the receptive partner in the past six months? [Receptive sex means your partner put his penis into your anus]

1  Never
2  Less than once a month
3  About once a month
4  2-3 times a month
5  About once a week
6  2-3 times a week
7  More than 4 times a week
9  No response

B5a. During the past six months, with what frequency did you use a condom when having anal sex with male partners where you were the receptive partner?

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time
9  No response

[Now I will ask you some questions related to your behaviours that may be illegal. Please remember: the survey is entirely anonymous and confidential; none of this information will be reported to the police.]

B6. Have you ever tried one of illegal or addictive drugs without being authorized by a doctor?

1  Yes
2  No (Skip to E1)
9  No response

B7. Have you ever injected drugs in the past year?

1  Yes
2  No (Skip to E1)
9  No response

B8. During the past year, have you injected drugs using a used or contaminated syringe, or sharing a syringe with someone?

1  Yes
2  No
E: Commercial sex

E1. Have you ever paid money to any males in exchange for sex?
1 Yes
2 No (Skip to E2)
9 No response

E1a. In the past six months, have you paid money to any males in exchange for sex?
1 Yes
2 No (Skip to E2)
9 No response

E1b. In the past six months, with how many male partners have you had sex by paying them?

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(No response 999)

E1c. The last time you paid money to have anal sex with a male, was a condom used?
1 Yes
2 No
9 No response

E2. Have you ever had sex with any male in exchange for money?
1 Yes
2 No (Skip to F1)
9 No response

E2a. In the past six months, have you had sex with any male in exchange for money?
1 Yes
2 No (Skip to F1)
9 No response

E2b. In the past six months, with how many male partners have you had sex in exchange for money?

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(No response 999)

E2c. The last time you had anal sex with a male in exchange for money, was a condom used?
1 Yes
2 No
9 No response
Appendices

F1. STI test history

F1. Has a doctor, nurse, or a health worker ever told you that you were infected with any kind of sexually transmitted diseases?

1  Yes
2  No (End of interview)
9  No response

F1a. So far, which of the following sexually transmitted diseases have you infected with?

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[The following is for interviewers only]

F2. Does the respondent provide an eligible urine sample?

1  Yes
2  No

F3. HIV rest results

1  Positive
2  Negative
3  Unconfirmed

[Thank you very much for participation.

If you have any questions, suggestions or comments about this investigation or you have questions about HIV/AIDS, please feel free to talk with the interviewer. He had been trained to give professional counseling.]

Notes:
APPENDIX B:

INFORMED CONSENT FORM

— Community-based HIV/AIDS behavioural surveillance among MSM, 2002-2006

I. The study

The study, which is a part of the comprehensive HIV/AIDS behavioural surveillance system among MSM in China, is being conducted in Harbin to explore their risk sexual behaviours for HIV infection and transmission.

The results of this survey will be compared with two surveys that have been completed in 2002 and 2004, to explore changes in HIV prevalence and risk behaviours. It will assist in developing HIV/AIDS prevention programs. It can also help with raising awareness of the government, developing tailored intervention programmes, and determining the pathways the HIV virus might follow if nothing is done to stop its spread.

II. What do you have to do to be in this study?

You will be asked some questions about your age, marital status, educational level, occupation, knowledge on HIV/AIDS, your sexual behaviours with males or females, condom use during anal sex and drug use behaviours. You will also be asked to provide 20ml urine samples to test your HIV status. The whole process will take you about 20 to 30 minutes.

III. Anonymity and Confidentiality

1. The whole investigation process is anonymous. No individual identification information will be collected. Completed questionnaires will be kept in a secure cabinet in a locked office. Once entered, electronic data will be kept in an appropriate password protected computer data base, on a password protected network within the password protected and fire-walled computing environment.

2. Whether to join this study is completely up to you. You may refuse to participate or withdraw from this investigation at any time. You have the right to refuse to answer questions that you are not comfortable with.

IV. Who is eligible to be in this study?

If you are a male, 18 years old or over, having or have had oral or anal sex with a man in the past twelve months, we invite you to join. If you do not fit this description, please do not participate.
V. Risks and discomforts

You may feel uncomfortable about answering some questions about sexual and drug use behaviours. If you can completely understand the questions on the questionnaire and would like to complete the questionnaire by yourself, you can do it. The interviewer will check each form’s consistency and completeness.

You may be willing to participate but concern exposing your privacy by signing your real name on the Consent Form. In this study signing your real personal name is not necessary. You can sign any name you like, such as “agree”. Signed Consent Forms with your signatures will be stored separately from questionnaires.

You may be concerned that someone else may know your HIV status. Please be advised that HIV testing was anonymous and data collection was strictly confidential. None of your personal information can be linked to the HIV test results. All participants who had HIV test will receive pre-test counselling, prevention information, and appropriate referrals to health professionals.

If you want to know your HIV test results, you will be provided a card with your Questionnaire number and a four-digital code. After four weeks of the interview, test results can be obtained from the specified Centres for Disease Control and Prevention. However, you might feel anxious or sad when you know your test results. Post-test counselling will also be provided by health professionals at the specified Centres for Disease Control and Prevention. Participants who are HIV positive will be referred to related CDCs for appropriate care or treatment support and HIV case management services.

VI. Compensation

No monetary compensation can be offered for your participation in this study. However, you may benefit from the counselling support we provide in this study, and know how to protect yourself from being infected with STI/HIV. In particular, you will receive a pack of condoms (12 items), a bottle of lubricant (40 ml. Brand: KY) and a series of HIV/AIDS prevention brochures.

VII. Contacts

This study is being carried out by National Centre for AIDS/STD control and Prevention, Beijing, China and Department of Public Health, University of Adelaide, Australia.

If you have any questions, please contact:

Dr Dapeng Zhang,

Discipline of Public Health, University of Adelaide, Australia.

Email: dapeng.zhang@adelaide.edu.au

Mobile: 86-13671321357
Office: 86-10-63039077

If you would like to participate, please sign here:

Participant:

Signature: __________________

Date: __ __/___ ___/2006

Interviewer:

Signature: __________________

Date: __ __/___ ___/2006
APPENDIX C: DESIGN OF THE STUDY WEBSITE

Figure 3-a: The welcome screen of the study website

Figure 3-b: The webpage of the online informed consent form
Figure 3-c-1: The online questionnaire

Figure 3-c-2: The online questionnaire
Appendices

Figure 3-d: The banner on the homepage of a gay website

Figure 3-e: The banner on the homepage of a gay website
Appendices

Figure 3-f: The popup on the homepage of a gay website

Figure 3-g: The banner in the chat room of a gay website
APPENDIX D:

INFORMED CONSENT FORM
—— Internet-based HIV/AIDS behavioural surveys among MSM, 2006-2007

I. The study

The study is going to use web-based questionnaires to describe the sex seeking behaviours of Chinese gay website users, and thus to evaluate their risk for HIV infection and transmission. This study can provide important practical recommendations for the development and improvement of the current HIV/AIDS surveillance system in China. Meanwhile it will help with planning appropriate intervention programs to stop the transmission of HIV among the MSM population.

II. What do you have to do to be in this study?

You are required to read through the informed consent form. If you understand the information provided in this form and are eligible for participation, we invite you to take part in this study. You can see a button at the bottom of this sheet saying “I agree”. Clicking the button can lead you to the questionnaire webpage.

Please answer each question on the questionnaire following instructions. You will be asked some questions about your age, marital status, educational level, occupation, your pattern of Internet use, and your sexual behaviours with males or females et al. You do not need to complete every single question before proceeding to the next one.

After completing the questionnaire, you should click a button saying “Submit” at the end of the questionnaire to submit it. The whole process will take you about 20 minutes.

III. Anonymity and Confidentiality

1. The whole investigation process is anonymous. No identifying information will be collected. Completed questionnaires will be kept in an appropriate password protected computer data base, on a password protected network within the password protected and fire-walled computing environment.

2. We promise there is no IP address determination process during the investigation process. That means you need not to worry the possibilities of determining your personal information by tracing your IP address.

3. Whether to join this study is completely up to you. You may refuse to participate or withdraw from this investigation at any time. You have the right to refuse to answer questions that you are not comfortable with.
IV. Who is eligible to be in this study?

If you are male, 18 years old or over, having or have had oral or anal sex with a man in the past 12 months regardless of self identifying as being homosexual, bisexual or heterosexual, we invite you to join.

If you do not fit this description, or you have trouble understanding any of the information we provide, please do not participate. In addition, please do not submit the questionnaire twice.

V. What can go wrong?

You may feel uncomfortable about answering some questions about sexual and drug use behaviours. Please remember no information can be related to your personal identification, and nobody will and can know. You may be concerned about the possibility of identifying your Internet Protocol (IP) address. There is no IP address determination process during the investigation. Cookies will not be used either.

At the bottom of this form, there is a button saying “I Agree”. By clinking it is assumed that you agree to participate. If you do not fit the criteria of participation, or have trouble understanding the information provided in this study, we suggest you do not take part in. Or you can contact us to make questions clear.

VI. What will you get?

Although no monetary compensation will be offered for your participation in this study, you will benefit from having taken part. Links to STD/HIV prevention and training websites and HIV/AIDS consulting numbers will be provided. In particular, you can email or call us to consult any issue regarding HIV/AIDS.

VII. Who to contact?

If you have any questions, please contact:
Dr Dapeng ZHANG,
Email: dapeng.zhang@adelaide.edu.au
Mobile: 86-13681063291
Office: 86-10-63039077

VIII. How do you join?

That's it! You can click the button below to submit your questionnaire.

I agree! (Click here to participate)
APPENDIX E:

HIV/AIDS BEHAVIOURAL SURVEYS (BSS) among MSM
—2006 online survey

G1 Questionnaire Number: MSM_1
G2: Date of survey: 2006-04-01

A: Background characteristics

A1. What is your date of birth? /____/____/________/ (MM/DD/YYYY)
   (No response: 99-99-9999)

A2. What is the highest level of school you completed?
   1  Never
   2  Primary school not completed
   3  Primary school
   4  Secondary school
   5  High school
   6  College/University
   7  Post graduate or over
   8  Other (specify) ____________
   9  No response

A3. Do you have a job (either full time or part-time) now?
   1  Yes
   2  No
   9  No response

A4. What is your usual occupation?
   (What kind of work do you do most of your time?)
   1  Student
   2  Factory worker
   3  Office clerk
   4  Self-employed businessman
   5  Teacher or doctor
   6  Driver
   7  Soldier or policeman
   8  Farmer
   9  Clerk of entertainment establishments
   10 Other (specify) ________________
   11 Unemployed
   99 No response
A5. What is your marital status?

1  Single
2  Married
3  Divorced
4  Separated
5  Widowed
6  Cohabiting
9  No response

A5a If you are currently in a cohabiting relationship with someone, your partner is:
(By a cohabiting partner we mean with whom you are currently living)

1  Male
2  Female
9  No response

A6. In which province are you currently living?

[List of all 31 provinces]

A7. Do you think of yourself as:

1  Heterosexual
2  Homosexual
3  Bisexual
4  Unknown
5  Other (specify) _______________________
9  No response

B: Sexual behaviors

[The next questions are about your sexual behavior. By sex we mean oral, vaginal, or anal sex, but not masturbation.]

B1. How old were you when you had your first sexual contact? That is, how old were you when you firstly did any of the following: oral, vaginal or anal sex?

<table>
<thead>
<tr>
<th>Age</th>
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</thead>
<tbody>
<tr>
<td>Don’t remember</td>
</tr>
<tr>
<td>No response</td>
</tr>
</tbody>
</table>

B1a. Your first sexual partner was:

1  Male
2  Female
9  No response

B1b. During the past 12 months, have you had oral, vaginal or anal sex with any male partner?

1  Yes
2  No (Skip to END)
9  No response (Skip to END)
[Now I have some questions related to your sexual experience with females.]

B2. During the past six months, have you had sex with female partners?

1  Yes
2  No (Skip to B4.)
9  No response (Skip to B4.)

B2a. During the past six months, with how many different women have you had sex? 

[Oral sex, vaginal sex or anal sex]

Number of female partners: ______
No female partners  000
No response  999

B3. With what frequency did you use a condom when having vaginal or anal sex with all your female partners in the past six months?

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time
9  No response

[Now I have some questions related to your sexual experience with males]

B4. During the past six months, have you had sex with male partners?

1  Yes
2  No (Skip to B9.)
9  No response (Skip to B9.)

B4A. Now please think about how many different men have you had oral or anal sex with in the past six months? That is both the number where you have been the insertive partner and the number where you have been the receptive partner.

[Insertive sex means you put your penis into a partner’s anus]
[Receptive sex means your partner put his penis into your anus]

Number of male partners: ______
No response  999

B5. How often have you had anal sex with male partners where you were the insertive partner in the past six months?

[Insertive sex means you put your penis into a partner’s anus]

1  Never (Skip to B7)
2  Less than once a month
3  About once a month
4  2-3 times a month
5  About once a week
B6. During the past six months, with what frequency did you use a condom when having anal sex with male partners where you were the insertive partner?

1. Never
2. Less than 50%
3. Around 50%
4. More than 50%
5. Every time
6. 2-3 times a week
7. More than 4 times a week
8. No response

B7. How often have you had anal sex with male partners where you were the receptive partner in the past six months?

[Receptive sex means your partner put his penis into your anus]

1. Never (Skip to B9)
2. Less than once a month
3. About once a month
4. 2-3 times a month
5. About once a week
6. 2-3 times a week
7. More than 4 times a week
8. No response

B8. During the past six months, with what frequency did you use a condom when having anal sex with male partners where you were the receptive partner?

1. Never
2. Less than 50%
3. Around 50%
4. More than 50%
5. Every time
6. 2-3 times a week
7. More than 4 times a week
8. No response

B9. Have you ever tried one of illegal or addictive drugs without being authorized by a doctor?

1. Yes
2. No (Skip to C1)
3. No response

B10. Have you ever-injected drugs in the past year?

1. Yes
2. No (Skip to C1)
3. No response
B11. During the past year, have you injected drugs using a used or contaminated syringe, or sharing a syringe with someone?

1  Yes
2  No
9  No response

C: Use of gay websites

C1. Before this time you participate in this study, have you ever visited a website dedicated to gays or lesbians?

[Search news or health information, chatting with gay people or look for sexual partners and so on]

1  Yes
2  No (Skip to D1)
9  No response

C2. What have you used gay Websites for? [Tick as many as applicable]

1  Just looking/surfing
2  Look for health information
3  Meet men for casual sex
4  Meet the same man/men for sex on a regular basis
5  Online/Cyber sex
6  Meet men for a possible relationship
8  Other (specify) ___________________
9  No response

C3. Where do you access gay websites usually?

1  At home
2  At someone else’s home
3  At work
4  At Internet cafes
8  Other (specify) ___________________

C4. How often do you visit gay websites to look for male sex partners?

1  Every day
2  A few times a week
3  About once a week
4  Less than once a week
5  Less than once a month
6  Never
9  No response

C5. Have you ever looked for a male sexual partner successfully on the Internet?

1  Yes
2  No (Skip to D1)
9  No response
Appendices

C6. Why did you start using gay Websites to look for male sex partners?

[Tick as many as applicable]

1. My friends were doing it/talking about it
2. It sounded like a safe way to cruise
3. It sounded like an easy way to cruise
4. I was tired of cruising in bars/beats/public bathrooms
5. I thought it was a good way to get to know someone
6. I wanted sex straight away
8. Other (specify) _______________

C7. During the past six months, with how many different men met through the websites have you had sex?

Number of male partners: [___|___|___]

None 000 (Skip to D1)
No response 999

C8. During your last sex with a male met through the Internet, did you use a condom?

1. Yes
2. No
9. No response

D: Use of traditional gay venues

D1. Have you ever visited public gay venues before, such as gay bars, public bathrooms or sauna centers, public toilets and parks et al where gay people tend to gather?

1. Yes
2. No (Skip to E1)
9. No response

D2. If yes, how often do you visit these places?

1. Every day
2. A few times a week
3. About once a week
4. Less than once a week
5. Less than once a month
6. Never
9. No response

D3. Have you ever sought male sexual partners successfully in these venues?

1. Yes
2. No
9. No response
D4. During the past six months, with how many different men met in these places have you had sex?

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<thead>
<tr>
<th>Number of male partners:</th>
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<tbody>
<tr>
<td>None</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(Skip to E1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No response</td>
<td>999</td>
<td></td>
</tr>
</tbody>
</table>

D5. Did you use a condom during your last anal sex with a man met in these places?

1  Yes
2  No
9  No response

**E: Commercial sex**

E1. Have you ever paid money to any males in exchange for sex?

1  Yes
2  No (Skip to E2)
9  No response

E1a. In the past six months, have you paid money to any males in exchange for sex?

1  Yes
2  No (Skip to E2)
9  No response

E1b. In the past six months, with how many male partners have you had sex by paying them?

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<td>(No response</td>
<td>999</td>
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</tbody>
</table>

E1c. The last time you paid money to have anal sex with a male, was a condom used?

1  Yes
2  No
9  No response

E2. Have you ever had sex with any male in exchange for money?

1  Yes
2  No (Skip to F1)
9  No response

E2a. In the past six months, have you had sex with any male in exchange for money?

1  Yes
2  No (Skip to F1)
9  No response

E2b. In the past six months, with how many male partners have you had sex in exchange for money?

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<tbody>
<tr>
<td>(No response</td>
<td>999</td>
<td></td>
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</table>

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Appendices

E2c. The last time you had anal sex with a male in exchange for money, was a condom used?

1  Yes
2  No
9  No response

F1. STI test history

F1. Has a doctor, nurse, or a health worker ever told you that you were infected with any kind of sexually transmitted diseases?

1  Yes
2  No (Skip to F2)
9  No response

F1a. So far, which of the following sexually transmitted diseases have you infected with?

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<th>YES</th>
<th>NO</th>
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<td>F</td>
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</tbody>
</table>

F2. Have you ever had an HIV test?

1  Yes
2  No (Skip to End)
9  No response

F3. If yes, how you ever received a HIV positive result?

1  Yes
2  No
9  No response

[Thank you for participation!]
APPENDIX F:

HIV/AIDS BEHAVIOURAL SURVEYS (BSS) among MSM
—2007 online survey

G1 Questionnaire Number: MSM-__
G2: Date of survey: /_____/____/____ (YYYY/MM/DD)

A: Background characteristics

A0. Between Apr and Aug 2006, this online behavioral survey has been conducted on three gay websites: boysky.com, aixinsky.com and yntz.com. (Sponsored by the China National Centre for AIDS/STD Control and Prevention)? Did you participate in this online survey during that period of time?

1  Yes
2  No
3  Don’t remember
9  No response

A1. What is your age?   /_____/____/ (years)  (No response: 99)

A2. What is the highest level of school you completed?

1  Never
2  Primary school not completed
3  Primary school
4  Secondary school
5  High school
6  College/University
7  Post graduate or over
8  Other (specify)________________
9  No response

A3. Do you have a job (either full time or part-time) now?

1  Yes
2  No
9  No response

A4. What is your usual occupation?
(What kind of work do you do most of your time?)

1  Student
2  Factory worker
3  Office clerk
4  Self-employed businessman
5  Teacher or doctor
6  Driver
Appendices

A5. What is your current marital status?

1. Unmarried (including divorced, widowed)
2. Married (including separated)
3. No response

A5a. From the following statements, tell the one which is the most suitable to your current situation: (Only one response)

1. Currently married, living with female spouse
2. Currently married, living with other female partners
3. Currently married, living with a male partner
4. Currently married, not living with spouse or any other sexual partners
5. Not married, living with a female partner
6. Not married, living with a male partner
7. Not married, not living with any partner
8. No response

A6. In which province are you currently living?

[List of all 31 provinces]

A7. Do you think of yourself as:

1. Heterosexual
2. Homosexual
3. Bisexual
4. Unknown
5. Other (specify) ______________________
6. No response

B: Sexual behaviors

[The next questions are about your sexual behavior. By sex we mean oral, vaginal, or anal sex, but not masturbation.]

B1. How old were you when you had your first sexual contact? That is, how old were you when you firstly did any of the following: oral, vaginal or anal sex?

Age: [___|___]
Don’t remember 98
No response 99
B2. Your first sexual partner was:

1  Male
2  Female
9  No response

B2a. During the past 12 months, have you had **oral, vaginal or anal sex** with any male partner?

*By oral sex we mean you put your penis into your partner’s mouth or your partner put his penis into your mouth. Anal sex includes both insertive and receptive intercourse. Insertive sex means you put your penis into a partner’s anus. Receptive sex means your partner put his penis into your anus.*

1  Yes
2  No (Skip to END)
9  No response (Skip to END)

[Now I have some questions related to your sexual experience with females.]

B3. During the past six months, have you had sex with any other females?

1  Yes
2  No (Skip to B5)
9  No response

B3a. If yes, with how many different women have you had sex during the past six months?

**Oral sex, vaginal sex or anal sex**

Number of female partners: |___|___|___|
(No response 999)

B4. With what frequency did you use a condom when having vaginal or anal sex with all your female partners in the past six months?

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time
9  No response

[Now I am going to ask you some questions related your sexual experiences with males.]

B5. During the past six months, have you had **oral or anal sex** with any other males?

1  Yes
2  No (Skip to B26)
9  No response

B6. Now please think about how many different men you have had **oral or anal sex** with in the past six months? That is both the number where you have been the insertive partner and the number where you have been the receptive partner.
Appendices

Number of male partners: [___ | ___ | ___]
No response: 999

B8. Currently, do you have any regular male sexual partner?
[A regular partner means with whom you are married, living or in a serious relationship. (Boyfriends)]

- 1 Yes
- 2 No (Skip to B13)
- 9 No response

B9. If you have male regular partners, with how many regular partners have you had sex during the past six months?

Number of male partners: [___ | ___ | ___]
No response: 999

B10. During the past six months, with what frequency did you use a condom when having anal sex with your male regular partners?

- 1 Never
- 2 Less than 50%
- 3 Around 50%
- 4 More than 50%
- 5 Every time (Skip to B13)
- 9 No response

B11. Last time when you had anal sex with your regular male partner, was a condom used?

- 1 Yes
- 2 No
- 9 No response

B12. In the past six months when you have sex with your male regular partners, why didn’t you always use a condom? Please select appropriate reasons from the following statements. [NR: No response]

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>You did not like using condoms.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>Your partners did not like using condoms.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>No condom was available when you were having sex.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>The quality of the condom was bad; it often slipped or broke during sex.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>You couldn’t afford to buy enough condoms to use every time when having sex.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>You didn’t think you could catch the AIDS virus or pass the virus on to others.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>You were in a mutually faithful sexual relationship.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>You were in the heat of the moment.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I</td>
<td>You were too drunk.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>J</td>
<td>Other reasons, please specify:</td>
<td></td>
<td></td>
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</tbody>
</table>

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Appendices

B13. Currently, do you have any male non-regular partners?
[A non-regular partner means it is not a regular or commercial partner (non-spousal, non-cohabiting and non-commercial)]

1  Yes
2  No (Skip to B18)
9  No response

B14. If you have male non-regular partners, with how many non-regular partners have you had sex during the past six months?

Number of male non-regular partners: [___] [___] [___]
No response 999

B15. During the past six months, with what frequency did you use a condom when having anal sex with your male non-regular partners?

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time (Skip to B18)
9  No response

B16. Last time when you had anal sex with your non-regular male partner, was a condom used?

1  Yes
2  No
9  No response

B17. In the past six months when you have sex with your male non-regular partners, why didn’t you always use a condom? Please select appropriate reason from the following statements. [NR: No response]

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>You did not like using condoms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Your partners did not like using condoms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>No condom was available when you were having sex.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>The quality of the condom was bad; it often slipped or broke during sex.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>You couldn’t afford to buy enough condoms to use every time when having sex.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>You didn’t think you could catch the AIDS virus or pass the virus on to others.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>You were in a mutually faithful sexual relationship.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>You were in the heat of the moment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>You were too drunk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Other reasons, please specify:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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B18. In the past six months, have you had sex with a male partner whom you exchanged money for sex?

1  Yes
2  No (Skip to B22)
9  No response

B19. If yes, how many males have you paid in exchange for sex during the past six months?

Paid male sexual partners: [____] [____] [____]
No response 999

B20. During the past six months, with what frequency did you use a condom when having anal sex with males you paid for sex?

1  Never
2  Less than 50%
3  Around 50%
4  More than 50%
5  Every time (Skip to B22)
9  No response

B21. In the past six months when you have anal sex with male partners whom you exchange money for sex, why didn’t you always use a condom? Please select appropriate reason from the following statements. [NR: No response]

A  You did not like using condoms.
B  Your partners did not like using condoms.
C  No condom was available when you were having sex.
D  The quality of the condom was bad; it often slipped or broke during sex.
E  You couldn’t afford to buy enough condoms to use every time when having sex.
F  You didn’t think you could catch the AIDS virus or pass the virus on to others.
G  You were in a mutually faithful sexual relationship.
H  You were in the heat of the moment.
I  You were too drunk.
J  Other reasons, please specify: __________________________

B22. During the past six months, have you ever had sex with males in exchange for money?

1  Yes
2  No (Skip to B26)
9  No response

B23. If yes, during the past six months, with how many males have you had sex in exchange for money?

Male sexual partners: [____] [____] [____]
No response 999

B24. During the past six months, with what frequency did you use a condom when having anal sex with males in exchange for money?
B25. In the past six months when you have anal sex in exchange for money, why didn’t you always use a condom? Please select appropriate reason from the following statements. [NR: No response]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>You did not like using condoms.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>Your partners did not like using condoms.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>No condom was available when you were having sex.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>The quality of the condom was bad; it often slipped or broke during sex.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>You couldn’t afford to buy enough condoms to use every time when having sex.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>You didn’t think you could catch the AIDS virus or pass the virus on to others.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>You were in a mutually faithful sexual relationship.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>You were in the heat of the moment.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I</td>
<td>You were too drunk.</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>J</td>
<td>Other reasons, please specify:______________________</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

[Now I will ask you some questions related to your behaviours that may be illegal. You do not have to answer the sensitive questions. However, please remember: all questions will be anonymous and confidential; none of this information will be reported to the policemen.]

B26. Have you ever tried one of illegal or addictive drugs without being authorized by a doctor?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No (Skip to C1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B27. Have you ever injected drugs in the past year?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No (Skip to C1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B28. During the past year, have you injected drugs using a used or contaminated syringe, or sharing a syringe with someone?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C: Use of gay websites

C1. Before this time you participate in this study, have you ever visited a website dedicated to gays or lesbians?
[Search news or health information, chatting with gay people or look for sexual partners and so on]

1  Yes
2  No (Skip to D1)
9  No response

C2. What have you used gay Websites for? [Tick as many as applicable]

1  Just looking/surfing
2  Look for health information
3  Meet men for casual sex
4  Meet the same man/men for sex on a regular basis
5  Online/Cyber sex
6  Meet men for a possible relationship
8  Other ___________________
9  No response

C3. Where do you access gay websites usually?

1  At home
2  At someone else’s home
3  At work
4  At Internet cafes
8  Other ___________________

C4. How often do you visit gay websites to look for male sex partners?

1  Every day
2  A few times a week
3  About once a week
4  Less than once a week
5  Less than once a month
6  Never
9  No response

C5. Have you ever looked for a male sexual partner successfully on the Internet?

1  Yes
2  No (Skip to D1)
9  No response

C6. Why did you start using gay Websites to look for male sex partners? [Tick as many as applicable]

1  My friends were doing it/talking about it
2  It sounded like a safe way to cruise
3  It sounded like an easy way to cruise
4  I was tired of cruising in bars/beats/public bathrooms
5 I thought it was a good way to get to know someone
6 I wanted sex straight away
8 Other (specify) ____________

C7. During the past six months, with how many different men met through the websites have you had sex?

Number of male partners: |___|___|___|
None 000 (Skip to D1)
No response 999

C8. During your last sex with a male met through the Internet, did you use a condom?

1 Yes
2 No
9 No response

D: Use of traditional gay venues

D1. Have you ever visited public gay venues before, such as gay bars, public bathrooms or sauna centers, public toilets and parks etc where gay people tend to gather?

1 Yes
2 No (Skip to E1)
9 No response

D2. If yes, how often do you visit these places?

1 Every day
2 A few times a week
3 About once a week
4 Less than once a week
5 Less than once a month
6 Never
9 No response

D3. Have you ever sought male sexual partners successfully in these venues?

1 Yes
2 No
9 No response

D4. During the past six months, with how many different men met in these places have you had sex?

Number of male partners: |___|___|___|
None 000 (Skip to E1)
No response 999

D5. Did you use a condom during your last anal sex with a man met in these places?

1 Yes
2 No
9 No response
F1. STI test history

F1. Has a doctor, nurse, or a health worker ever told you that you were infected with any kind of sexually transmitted diseases?

1  Yes
2  No
9  No response

F1a. So far, which of the following sexually transmitted diseases have you infected with?

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Syphilis</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>Gonorrhea</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>Chlamydia infection</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>Non-specific genital ulceration</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>Genital warts (HPV)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>Genital herpes</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

F2. Have you ever had an HIV test?

1  Yes
2  No (Skip to End)
9  No response

F3. If yes, how you ever received a HIV positive result?

1  Yes
2  No
9  No response

[Thank you for participation!]
APPENDIX G: Abstracts of accepted manuscripts

International Journal of Infectious Diseases (2008) 12, 126-131

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http://intl.elsevierhealth.com/journals/ijid

REVIEW

Web-based HIV/AIDS behavioral surveillance among men who have sex with men: potential and challenges

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\(^b\) National Center for AIDS/STD Control and Prevention, Beijing, China

Received 17 January 2007; received in revised form 29 May 2007; accepted 21 June 2007
Corresponding Editor: William Cameron, Ottawa, Canada

KEYWORDS
Men who have sex with men; HIV; Behavioral surveillance; Internet

Summary  With more men who have sex with men (MSM) seeking sexual partners through the Internet, the Internet has been characterized as a newly emerging risk environment for HIV transmission. Meanwhile, the flourishing of gay websites provides a good opportunity for health professionals to conduct systematic HIV/AIDS behavioral surveillance among MSM. Effective methods to recruit online MSM users have been developed, and online surveys have suggested many practical advantages over surveys in the traditional gay community. Although surveys among MSM via the Internet have a few limitations and risks, online surveillance can still be viewed as a feasible and convenient approach, especially in countries where the HIV/AIDS epidemic is concentrated in high-risk populations and where the conducting of such surveillance in traditional gay venues is difficult.

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Introduction

Successful HIV prevention among men who have sex with men (MSM) depends on changing risk behaviors that put them at high risk for HIV. This mainly includes increasing condom use, reducing the number of sexual partners, reducing needle-sharing behavior, and delaying the onset of first intercourse. In order to promote changes in the behaviors mentioned above, every country needs evidence-based information to guide the design of appropriate prevention programs and to monitor and evaluate whether these efforts are successful. Systematic surveillance of risk behaviors over time among MSM can provide important information for better understanding HIV/AIDS in the community, predicting incidence, and planning intervention programs. 1,4

Public health surveillance is "the ongoing systematic collection, analysis, and interpretation of health data, closely integrated with the timely dissemination of these data to those providing the data and to those who can apply the data to control and prevention programs". 5 Therefore HIV/AIDS surveillance addresses systematic data collection and dissemination of data to those who need it so that action can be taken. However, since the advent of the HIV epidemic, the focus of HIV/AIDS surveillance has changed with the understanding of

\ast Corresponding author. Tel.: +61 8 303 6888; fax: +61 8 303 6885; E-mail address: peng.bi@adelaide.edu.au (P. Bi).

Dapeng Zhang a, Peng Bi a,*, Fan Iv b, Jie Zhang c, Janet E. Hiller a

a Discipline of Public Health, University of Adelaide, 10 Pulteney Street, Adelaide, SA 5005, Australia
b National Centre for AIDS/STD Control and Prevention, Center for Disease Control and Prevention, 27 Nanwei Road, Xuanwu District, Beijing 100050, China
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Accepted 28 June 2007
Available online 22 August 2007

KEYWORDS
HIV/AIDS;
Prevalence;
Behavioral surveillance;
Men who have sex with men;
China

Summary Objective: To examine HIV prevalence and sexual behavior changes among MSM in Harbin.
Methods: Three community-based cross-sectional surveys among MSM were conducted based on the same protocol and methodology in 2002, 2004 and 2006 in Harbin, China. Men who were eligible were interviewed with a standard questionnaire. Urine samples were collected to screen their HIV status.
Results: Among the MSM in Harbin, an increased trend was observed towards more self-identifying as homosexual (from 58% to 80%) and more living with a male partner (from 12% to 41%) over the study period. Although there was a trend towards a reduction in the rate of never using a condom and an increase in the rate of always using condoms during anal sex in the past six months, the prevalence of unprotected anal intercourse (UAI) was still at a high level (from 90% in 2002 to 72% in 2006). The HIV prevalence in 2006 (2.3%, 15/674) was higher than that in other study years, but no statistically significant change was detected.
Conclusions: Although an increase in condom use and a decline in drug use, STD infection and commercial sex have been monitored under current HIV prevention strategies, the MSM in Harbin is still highly vulnerable to HIV transmission given a high level of UAI and an increasing number of male sexual partners over the study period.

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Introduction

China is facing an emerging HIV epidemic among men who have sex with men (MSM). This has been widely demonstrated in government documents and research findings.1–8 The 2005
Appendices

INTERNET

Internet use and risk behaviours: an online survey of visitors to three gay websites in China

D Zhang, P Bi, F Lv, H Tang, J Zhang, J E Hiller

Sex Transm Infect 2007;83:571-576. doi: 10.1136/sti.2007.026138

Objectives: To describe the risk behaviours of visitors to gay websites and to explore the role of the internet in the HIV transmission among the Chinese men who have sex with men (MSM).

Methods: Between May and August 2006, visitors of three Chinese gay websites were invited to complete an online questionnaire about the use of the internet and risk sexual behaviours.

Results: The median age of the online sample was 25 years (range 18 to 64). Over three-quarters (77.6%) had an education of college or higher. Less than 44% of the online sample reported little or no risk for HIV transmission. These men had either had no anal intercourse (28.0%) or had always used a condom for anal intercourse (15.8%). Although only about half of the participants reported that their main purpose of visiting the gay websites was to look for sexual partners, most participants (86.1%) had used the internet to seek partners. Compared with men seeking sexual partners only on the internet, men seeking partners both in traditional gay venues and on the internet were older, less likely to be students and more likely to have unprotected anal intercourse, more than six sexual partners in the past 6 months and commercial sex behaviours.

Conclusion: The users of the gay websites are relatively young and well educated, and highly vulnerable to HIV/AIDS, given their low prevalence of consistent condom use and multiple-risk sexual behaviours. Effective intervention programmes should be implemented and strengthened in China, especially for those who seek sexual partners both on the internet and in traditional gay venues.

The world wide web has become a widely used meeting place for facilitating sex networking among men who have sex with men (MSM) in developed countries.

its anonymous nature and relatively confidential environment maintain men’s privacy. The numerous users make men easily find other men for sexual and social contacts. While the internet enhances sex-seeking efficiency, it may also place MSM at high risk for HIV/STI. The increasing number of studies conducted in developed countries have demonstrated that MSM who seek sexual partners on the internet are more likely to have unprotected anal intercourse (UAI) and more sexual partners and to have a history of STD. However, no studies have been conducted in China—the largest developing country in the world—to explore sex-seeking behaviours and the use of the internet among this specific group.

China is facing an emerging HIV epidemic among MSM. Although limited data show that HIV prevalence among this group remains at a relatively low level—for example, it was 3.1% in Beijing, 1.7% in Guangdong (Southern China) and 1.2% in Shenyang (northern China)—high-risk behaviours such as UAI and multiple sexual partners and deficiency of HIV preventive knowledge place the Chinese MSM at high risk for HIV infection. Evidence also demonstrates that Chinese gay men are avid users of the internet. In 2001, for instance, there were more than 250 Chinese websites dedicated to gays, lesbians and bisexual people (gay websites). By the end of 2004, the number of people accessing broadband connections increased to 94 million. In addition, it has been reported that there are approximately 10-20 million gay men in China, accounting for 2-4% of the adult male population. The unique nature of the internet may attract more Chinese MSM to choose the internet to socialise and seek sex in addition to or instead of traditional gay venues, as homosexuals in China are still under huge cultural pressure from the society and family. A number of questions associated with the gay websites in China need to be answered. Who are using the gay websites? What and why are they using the gay websites? Are the gay websites users vulnerable to HIV infection? Are those MSM who seek sexual partners on the internet at higher risk for HIV than those who seek sexual partners from traditional gay venues and in other ways? The purpose of this project was to explore the characteristics of Chinese gay websites users and their risk behaviours in the use of gay websites for sexual purposes, and then to provide evidence for developing possible HIV/AIDS surveillance and intervention strategies in the internet era.

METHODS

Subjects

Participants in this study were visitors of three gay websites: http://www.atixinsky.com, http://www.ytzn.net and http://www.boysky.com. Atixinsky.com attracts more than 10,000 daily hits and has over 100,000 registered members.

Abbreviations: MSM, men who have sex with men; UAI, unprotected anal intercourse

www.stijournal.com
Differences between Internet and community samples of MSM: implications for behavioral surveillance among MSM in China

Dapeng Zhang\textsuperscript{a}, Peng Bi\textsuperscript{a*}, Fan Li\textsuperscript{a}, Jie Zhang\textsuperscript{a}, and Janet E. Hiller\textsuperscript{a}

\textsuperscript{a}Discipline of Public Health, University of Adelaide, Adelaide, Australia. \textsuperscript{b}National Center for AIDS/STD Control and Prevention, China Center for Disease Control and Prevention, Beijing, China; \textsuperscript{c}Centers for Disease Control and Prevention, Hefei, China

(Received 11 June 2007; final version received 4 December 2007)

This study compared the difference between two samples of men who have sex with men (MSM) in Harbin, China, using cross-sectional data that were collected via the Internet and through conventional venue-based outreach. All participants in both samples lived in or nearby Harbin in northeast China. Results showed that the Internet sample was significantly younger, more educated and more likely to be students and to self-identify as homosexual than the community sample. After controlling for demographic characteristics, the community sample was more likely to have had sex with females (OR 2.91, CI 1.22–6.35, \(p = 0.026\) and to have had 6 male partners in the previous six months than the Internet sample (OR 4.88, CI 3.51–6.80, \(p < 0.001\)). No significant difference was observed in the prevalence of unprotected anal intercourse, exchanging sex for money, exchanging money for sex or illicit drug use between the two samples. For those seeking sex both on the Internet and in traditional gay venues, participants in the community sample were nearly three times more likely to have had 6 male partners during the previous six months than those in the Internet sample (\(p = 0.001\)). In conclusion, the online and offline samples of MSM are significantly different and carry different levels of risk for HIV transmission. Using the Internet as a data collection method may serve as an additional mechanism for the existing gay venue-based behavioral surveillance system in China.

Keywords: HIV; MSM; behavioral surveillance; Internet; China

Introduction

Behavioral surveillance among men who have sex with men (MSM) is an essential component of a comprehensive HIV/AIDS surveillance system, especially when HIV prevalence is at a low level (McFarland \\& Caceres, 2001; UNAIDS/WHO, 2002). Systematic HIV/AIDS behavioral surveillance among the Chinese MSM population, however, lags behind the demands of appropriate public health practice (Choi, Dehl, Guo, Qiu, \\& Mandell, 2002). There is only one HIV sentinel surveillance site for MSM in a northern Chinese city, which was set up in 2002. HIV/AIDS behavioral surveillance among this group in six cities commenced in 2004. Unfortunately these surveillance sites are not functioning well for various reasons. These reasons include: (1) difficulties in reaching MSM because of their preference for anonymity and fear of exposure resulting from stigmatization and discrimination against homosexuality; (2) prohibitive costs of conducting behavioral surveys in a community setting with limited health resources; and (3) low HIV prevalence among the Chinese MSM population, which makes MSM a lower priority in that it is perceived that HIV transmission through drug injection and heterosexual contacts (mostly commercial sex) is more important than homosexual transmission (Liu et al., 2006; Ruan \\& Tai, 1988; Zhang \\& Chu, 2005).

An increasing number of Internet-based behavioral surveys have been conducted among MSM around the world because using the Internet provides many advantages over the traditional pen-and-paper investigations (Andrews, Nonnecke, \\& Price, 2003; Bull, McFarlane, \\& Rietmeijer, 2001; Couper, 2000; Elford, Bolding, Davis, Sherr, \\& Hart, 2004; Fricker \\& Schonlau, 2002; Rootstock 2001). Internet-based surveys are cost-effective and allow respondents the opportunity to answer questions anonymously and maintain their privacy. Also, the Internet provides a limitless number of potential respondents. These advantages presented by the Internet may solve some of the common challenges that behavioral surveillance is facing among the Chinese MSM population. Internet use in China is increasing rapidly. By the end of 2006 there were more than 130 million people accessing the Internet regularly in China (China Internet Network Information Centre (CINIC), 2007). Evidence also shows that Chinese