Report on the Assessment of Recently Acquired HIV Infection in Men Having Sex with Men (MSM) in Hong Kong

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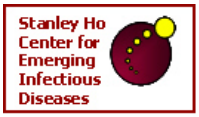
Stanley Ho Centre for Emerging Infectious Diseases

The Chinese University of Hong Kong



Disclaimer

This report was prepared by Professor SS Lee, Dr. Edmond Ma and Ms. Dennis Tam of the Stanley Ho Centre for Emerging Infectious Diseases, the Chinese University of Hong Kong. The content of the report was based on the results of studies conducted by the aforementioned researchers. The views contained herein do not represent those of the Stanley Ho Centre for Emerging Infectious Diseases, nor the Centre for Health Protection of the Department of Health, Hong Kong.

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Executive Summary

1. In response to the rising trend of HIV prevalence and reports among men having sex with men (MSM) reported by Centre for Health Protection, Department of Health, Hong Kong, a study was conducted to assess the situation, explore the underlying risk factors and suggest evidence-based recommendations. The study comprises a desktop review of the global and local HIV situation in MSM, a qualitative interview with HIV positive MSM and key stakeholders, and a questionnaire survey administered on HIV positive MSM attending two specialist clinics in the territory.

Global and local HIV infection among MSM

2. Worldwide, there's an emerging epidemic of HIV in MSM populations. About 5 to 10% of people living with HIV were transmitted between men in 2005. In Western Europe and North America, MSM accounted for about half of all HIV cases diagnosed. In Southeast Asia, it is estimated that there are about 10 million MSM. Prevalence of HIV varies from less than 1% in Malaysia to 28% in Bangkok of Thailand. In the past five years, HIV among MSM rose sharply in the United States, Canada, many European and Southeast Asia countries. In Rome, Spain and Australia, for example, the HIV incidence among MSM has doubled or tripled within the past 5 years.

3. Various factors have been suggested to explain the global epidemic. An increasing number of sex partners and the practice of unprotected anal intercourse have been reported. MSM who are online tend to have multiple casual partners and unprotected sex. Party and party drugs (including Viagra) are popular in the MSM community. They are associated with unprotected anal sex and HIV infection. Other contributing factors include lower risk perception associated with improved treatment of HIV, international travel and commercial sex.

4. The situation in Hong Kong is similar to that in other countries. Data from different sources suggested that new infections in MSM have doubled within the past 3 years. The sharp rise among MSM has dominated the overall increase of HIV infection contracted through risk behaviours in Hong Kong. Most of the HIV positive MSM patients are Chinese young or middle aged adults who acquired the infection in Hong Kong through non-regular, non-commercial sex. Epidemiological investigation of two clusters of 46 patients detected in 2006 suggested that there were very active sexual activities among subgroups of MSM. Local studies suggested the condom usage rate among MSM was in the range of 60%. Cross border sex, getting acquaintance with sex partners through internet and having sex in sauna were common practice. A mathematical model predicted a 3-fold increase in the cumulative number of HIV infected MSM within 5 years.

MSM risk network

5. MSM interact in networks which link together individuals as well as through access points called “nodes”. Some, like the internet and gay-oriented magazines, are information nodes that link people to physical venues (physical nodes) where sexual activities may occur. The profile and popularity of these nodes have changed over the years. Public toilets are no longer popular and are replaced by saunas, massage houses, bars and parties in the past decade. Internet provides a virtual platform where MSM can meet at any time and place.

6. Apart from a change of the popularity of the nodes, there has been an intensification of connections between different nodes with internet playing a central position. In a simulation exercise, given the same level of risk behaviours, the increased connection of nodes would predispose to HIV transmission through enhancing the exposure opportunities of individual MSM.

Vulnerability of MSM to HIV infections

7. The partnership pattern of MSM has changed in the recent 5 years, as reflected in the results of a questionnaire survey that explored the behavioural practice before their infections. Public toilets and beaches became less popular while internet was the main avenue for sourcing sex partners. Home has become the most common venue for sex although sauna remains popular in the MSM community. About half of the HIV infected MSM had history

of visiting other countries for sex before their contracting the virus. An important observation is that HIV was not perceived as a significant risk by some MSM.

8. Generally speaking, the practice of sexual behaviours (condom usage, oral/anal sex, active or passive role) has remained largely the same in MSM who contracted the virus recently (on or after 2001) in comparison to those infected before 2001. The pattern of safer sex practice with regular and casual partners have also remained the same, while commercial sex was relatively uncommon over the years. However, an increasing use of soft drugs while having sex was observed. This was often associated with parties where MSM might have sex.

9. As regards the process of identity formation, MSM (from the study on HIV infected MSM) identified themselves as homosexual at around 17 years of age. They normally entered the MSM network and had first sex at about 23 years old, and subsequently got infected at an average age of 30s. The popularity of internet means that young MSM can easily come into contact of MSM network during or shortly after the period of identity formation

10. It is encouraging to discover from our study that after diagnosis of HIV, MSM have generally reduced their practice of identifying partners and having sex in various gay venues (physical nodes). Condom usage rate has generally increased. The contexts of such improvement and whether this can be sustained is however not known.

Conclusions and recommendations

11. We conclude that the changing partnership patterns and therefore the evolving configuration of MSM network constituted the major driving force behind the observed increase of HIV infections in MSM in Hong Kong.

12. Six recommendations are made: (a) strategically promote safer sex targeting young MSM at different time period from identity formation to exposure to HIV risk; (b) design specific interventions to reach MSM on line, who are prone to have unprotected sex at home; (c) develop HIV prevention that incorporates sexual health instead of HIV *per se*, so as to circumvent the indifference of some MSM to HIV; (d) systematize clinic-based HIV prevention; (e) develop pilot projects and/or studies that integrate programmes on soft drug abuse and HIV prevention, and cross country interventions; (f) introduce case investigation that characterize partnership for supporting the control of HIV spread.

Chapter 1 Introduction

1.1 Background

1. To this day, the HIV situation in Hong Kong has been described as one of a low level epidemic in accordance with UNAIDS/WHO definition.[1] The main routes of transmission are sex between men (MSM) and heterosexual contacts. Transmission as a result of needle-sharing in injection drug users (IDU) has so far been uncommon.[2] There's also little evidence of any epidemiologic link between the infections in Hong Kong and the Mainland.[3]

2. There were recent reports in Hong Kong of an increasing number of MSM diagnosed with HIV, alongside a higher prevalence in the MSM community. This was highlighted in a consultancy report submitted by Dr Tim Brown to the Department of Health. The Stanley Ho Centre for Emerging Infectious Diseases (CEID) of the Chinese University of Hong Kong (CUHK) was subsequently approached by the Controller of Centre for Health Protection (CHP) to propose a project to assess the reasons behind the observed trend and to recommend evidence-based interventions. This was approved by the Director of Health in August 2006.

3. A study team was formed composing of S S Lee (Professor of Infectious Diseases, CEID), Edmond Ma (Adjunct Assistant Professor, CEID, on secondment from CHP) and Dennise Tam (Research Assistant, CEID) to develop plan, organize

studies, and report key findings to CHP/DH. The Team was in operation between 11 September 2006 and 9 March 2007.

1.2 Objectives and methodological layout

4. The primary objective of the Project was to assess the risk of HIV spread among MSM in Hong Kong, through:

(a) describing the epidemiologic pattern of incident HIV infections in MSM, focusing on the delineation of the characteristics in the recent three or five years;

(b) determining the factors associated with the observed trend;

(c) developing recommendations on the programmatic responses

5. The proposed Project was planned to be undertaken during a six-month period. There were three interlinking components: a desktop review, a qualitative study, and a questionnaire survey.

6. A desktop review was undertaken to evaluate HIV epidemiology and related transmission dynamics in MSM in Hong Kong, through the collation, critique and synthesis of available data and reports (published and unpublished). The pattern in other parts of the world was assessed and interpreted in context of the situation in Hong Kong.

7. A qualitative study was conducted to describe the practice, setting and trend of risk behaviours pertaining to HIV spread in MSM in Hong Kong. The study involved interviews with HIV positive MSM and informants including key stakeholders in the community.

8. A questionnaire survey was undertaken to compare the pattern of risk behaviours in MSM who had acquired HIV infection recently and those in the past. The instrument was developed by taking reference from results of the qualitative study.

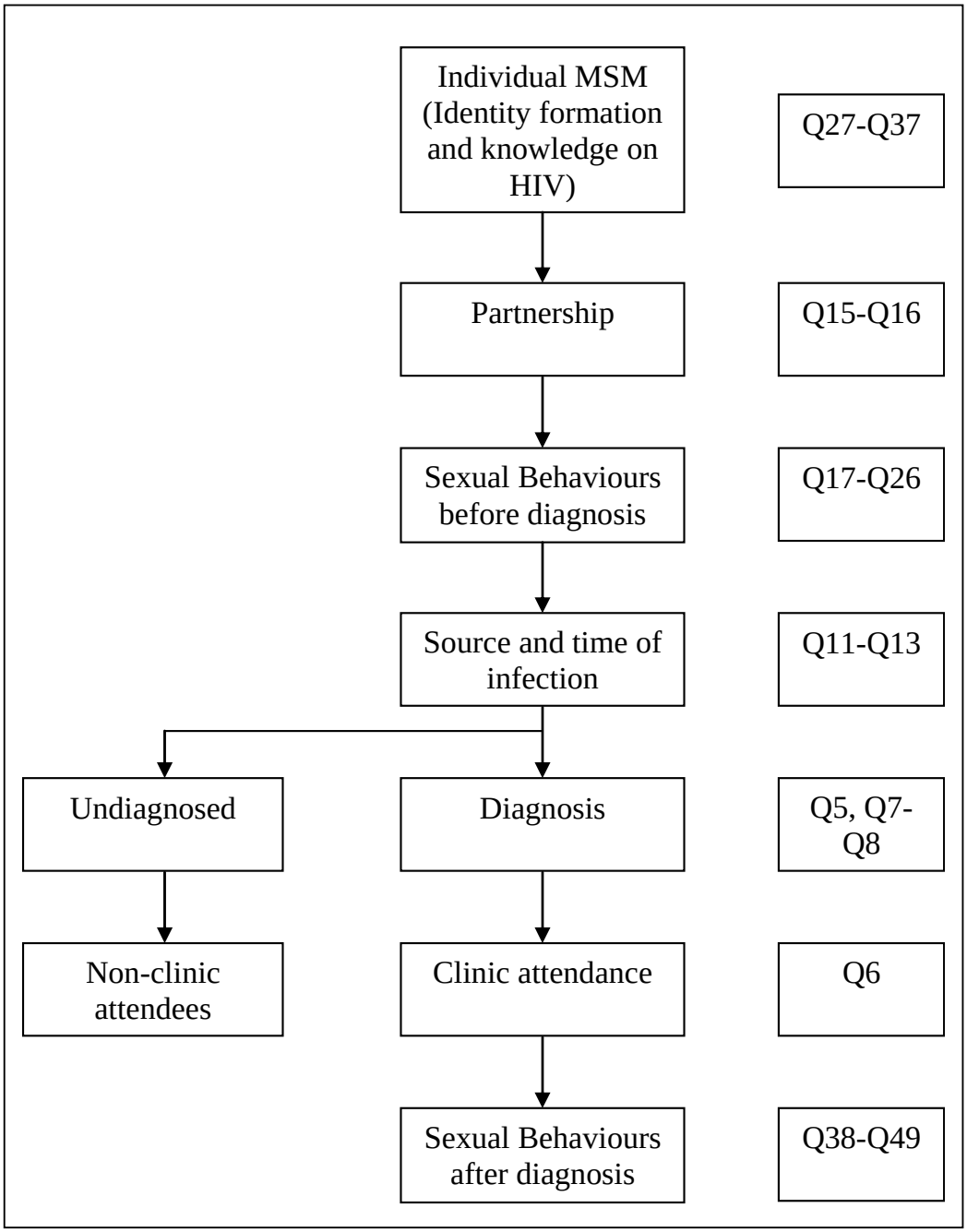
1.3 Study framework

9. The study was conceptualized with the following premise: that there's an observed increase of HIV infection in MSM in Hong Kong. Three hypotheses were put forward to explain the observation, on the assumption that HIV transmission has occurred either exclusively or predominantly through unprotected sex between men: Firstly, the number of risk taking MSM has increased; secondly; the level of risk behaviours in MSM has increased; and thirdly, the configuration of network of MSM in the community has changed, leading to an increased exposure to the virus. It's possible that all three scenarios coexist.

10. The desktop review was designed to compare the local and overseas situations, which aimed to enable us to determine if there's truly a rising trend of HIV infection in MSM. The qualitative study and questionnaire survey were constructed to assess

the relative importance of the second and third hypotheses. These were addressed by the themes of the different sets of questions in the questionnaire. (Box 1) The size of MSM population and high risk network in the community fall outside the scope of the study, and would need to be addressed in community-based research.

Box 1 Study framework for the questionnaire survey



1.4 Collaborators in the study

11. Since a majority of reported HIV/AIDS patients are regularly attending either one of the two HIV specialist services, they became the natural partners in the studies described in the Project. The qualitative study was conducted on patients recruited from the Integrated Treatment Centre, Department of Health. The questionnaire survey was conducted at both the Integrated Treatment Centre and the Special Medical Service of Queen Elizabeth Hospital.

12. Through the assistance of Red Ribbon Centre, informants were invited from the community to contribute their views on the HIV situation in MSM, and the pattern of networking of MSM through different establishments and information sources. A list of the informants is at Appendix E.

1.5 Ethical approval

13. The studies contained in the Project did not involve experimental investigations nor treatment. No adverse consequence was anticipated for MSM and HIV patients who joined the research. Participation in the studies was entirely voluntary and informed consent was obtained from potential participants in all cases. Personal particulars were not collected from the participants.

14. Ethical approval was obtained from the following committees before conduct of the qualitative study and survey:

(a) Ethics Committee of the Department of Health

(b) Research Ethics Committee (Kowloon Central / Kowloon East), Hospital Authority

(c) Survey and Behavioural Research Ethics Committee, Chinese University of Hong Kong.

1.6 Reporting study findings

15. The main findings of the studies are described in Chapter 2 (HIV situation in MSM in Hong Kong and overseas, from desktop review), Chapter 3 (HIV risk networks in MSM, from survey and interviewing stakeholders) and Chapter 4 (HIV risk behaviours, from the questionnaires survey).

16. Statistical summaries and administrative reports of the studies are included in the appendices.

Chapter 2 HIV situation among MSM

2.1 Introduction

17. This chapter reviews the global and local situation of HIV among men who have sex with men (MSM), with a focus on the rising trend of the infection in recent years. MSM is defined as a man who ever has sex with another man, and includes one who may also have sex with female (bisexual). For global situation, we reviewed information from the following sources: published literature, reports of international health organizations, health authorities of selected countries, published HIV reports, and recent International Conferences on AIDS (Please see Appendix A for details of source of information). For local situation, we reviewed data obtained from Special Preventive Programme of the Department of Health, published literature and documents produced by various organizations working on AIDS.

2.2 Global situation of HIV among MSM

18. As of the end of 2006, an estimated 39.5 million people were living with HIV worldwide and there were about 4.3 million new infections in the year.[4] It was estimated that about 5 to 10% of all HIV cases were transmitted between men.[5] Fewer than one in 20 MSM has access to the HIV prevention and care services they need.[5] The burden of HIV due to MSM varies according to different regions and countries.

19. HIV among MSM occurs at different frequency across Europe. In Western European countries, they account for 50% of all HIV infections. The HIV epidemic in Central Europe is in its initial phase, and in Eastern European countries less than 1% of all HIV infections have been reported in MSM.[6] The situation in North America is similar to that of Western Europe. MSM accounted for 44% of new HIV infections from 2001 through 2004 in the United States.[7] In Canada, 51% of all reported HIV infection were attributed to sex between men in 2005.[8] The average prevalence of HIV among MSM in 9 South American countries was 12.3%, ranging from 2.8% in ports of Ecuador to 27.8% in Guayaquil of Ecuador.[9] In Southeast Asia and the Pacific, conservative estimate showed that there were 10 million MSM.[10] Prevalence of HIV among MSM ranged from 0.76% in Malaysia to 28.3% in Bangkok of Thailand.[11-25] In China, it was estimated that 0.9% of MSM were HIV positive in 2005 (N=5,350,000).[21] Although sub-Saharan Africa has been bearing the largest burden of the AIDS epidemic, not much was known about HIV among MSM in this region.

20. At the turn of the century, HIV among MSM entered a transition phase in many countries. In some Western European countries, for example, a resurgence of HIV cases among MSM was observed in recent 6 years. An increasing trend from 2000 to 2005 was observed in the United States, Canada, the United Kingdom (UK), Switzerland, Italy, Denmark, Norway, Netherlands, Spain, Australia, Peru and Thailand.[26-39] For example in the UK, the HIV prevalence was high in 1980s and dropped in 1990s. However, there was resurgence since 2000. Similar pattern was observed in other countries (Appendix A).

21. The general pattern of an upsurge of HIV cases in MSM has been observed in not just western countries but also in Asia. It was suggested that the increasing practice of risk behaviours might have accounted for the rising prevalence of HIV in MSM and the reports of HIV infected MSM.

2.3 International trends of sexual behaviours and condom use

22. Numerous studies showed that high risk sexual behaviour among MSM was common.[40-49] These included both insertive and receptive unprotected anal sex, having multiple sex partners, having casual partners apart from regular partners and low condom usage rate. In a large cross-sectional survey in the US involving 100,000 subjects, 75% reported having a casual male sex partner and 47% had unprotected anal intercourse during the preceding 12 months.[40] In another US study, the high number of male partners and unprotected receptive anal intercourse with unknown status partners explained the occurrence of 32.3% and 21.6% of the infections respectively.[42]

23. It's important to know if high risk activities have increased. Overall, an increasing trend of high risk sexual activities was observed in various places.[50-52] In the UK, increased unprotected anal intercourse (UAI) with partners of unknown or discordant HIV status was reported among MSM recruited in gay venues from 1996 through 2002.[50] The number of sexual partners had also increased during similar period in Spain, while sex with casual partners had become more prevalent in Canada.[51-52]

24. Apart from the intensity of the scale of sexual activities, inconsistent use of condom was one of the important factors that underlined the growing HIV epidemic in MSM in some places. In Ecuador, one-quarter of MSM (study subjects=2594) had never used condom.[43] A cross-sectional survey of 6000 Indian MSM revealed that the lack of knowledge was the strongest associated factor for non-use of condom.[41] Data reporting the trend of condom usage was however limited, and may not be comparable.

2.4 Emerging pattern of sexual networking

25. In the past few years, internet has become a popular focal point for MSM to find sex partners. In a meta-analysis including 15 studies that had recruited MSM offline, 40% of MSM had used the internet to look for sex partners.[53] MSM who sought sex from the internet were generally younger, more likely to have engaged in unprotected sex, had multiple partners and had sexually transmitted infections.[53-56] Pooled results from 11 studies showed that unprotected anal intercourse was more likely among MSM who sought partners online than MSM who did not (OR: 1.68, 95%C.I. 1.18-2.40).[53]

26. A survey of 1218 MSM was conducted in London in 2002.[54] Compared to those recruited offline, MSM surveyed online were younger (34 vs 36 years), less likely to have been tested for HIV (68% vs 80%), more inclined to have unprotected anal intercourse with a partner of unknown or discordant HIV status (32% vs 22%). In another survey of 800 MSM, those who sought partners on internet were 3-fold more

likely not to use condom all the time with casual partners and 2-fold more likely to have 5 or more partners in the past 3 months.[55]

27. Since 1990s, party has become popular among MSM, who may engage in high risk sexual behaviour during these activities. Alcohol and drug use in these settings are common.[57-69] A WHO research explored reasons for attending parties from 1169 American party patrons.[61] Factor analysis revealed two correlated dimensions, namely, a social factor to be with friends and dance, and a sensation-seeking dimension, to have sex and drugs. Some 79% of the party patrons reported use of alcohol. The most commonly used drugs in the parties included methylenedioxymethamphetamine (Ecstasy), ketamine (Special K), cocaine, crystal methamphetamine (crystal meth), gamma-hydroxybutyrate (GHB), marijuana and volatile nitrites (poppers). Viagra use was reported in 12% to 32%.[58-60, 62-64, 67-68] Use of these drugs was significantly associated with UAI, multiple partners, having sex with causal partners and HIV infection [58-60, 63-67, 69].

28. In contrast to heterosexual men, commercial sex was relatively uncommon in MSM. In a Canadian Study, 16% (126 out of 761) of MSM reported engaging in commercial sex within one year prior to enrolment.[70] Those reported having commercial sex were more likely to be HIV positive (OR: 1.91, 95% C.I.:1.36-2.68), have anonymous sex (OR: 6.18, 95% C.I.3.37-11.32), not use condom (OR: 2.02, 95% C.I.1.:71-2.38) and use non-injecting drugs (OR: 1.65, 95% C.I.:1.21-2.37).[70] However, commercial sex could be very common among MSM in subgroups like drug-users and commercial sex workers. In a San Francisco survey, 68% of 227 MSM who were also drug-users had been paid by another man for sex.[72] Besides, the

prevalence of HIV among MSM sex worker was significantly higher than non-sex workers (7.3% vs 1.1%, p<0.001).[70]

29. There is increasing concern on the role of international travel contributing to spread of HIV, especially in Southeast Asia where circuit parties are held. Circuit parties are dancing parties held periodically in different locations across countries. The mixing of MSM through international travel contributes to the spread of HIV from high-prevalence to low prevalence areas. However, there is limited data on behaviours of these MSM. In a survey of 247 MSM tourists recruited in gay venues in Florida, 22% reported anal sex with multiple partners over a brief period (mean-4.1 days).[73] About one-third reported having sex with a partner met during the vacation period.

2.5 Psychosocial changes and HIV risk

30. Risk perception in MSM may have a significant impact on virus transmission. This involves a multitude of dimensions, including how likely one would get infected from HIV positive patients and the likelihood of an infected individual spreading the virus to another person. In general, the risk of contracting HIV perceived by the MSM was low.[74-78] In a large US study among young MSM, only one-quarter perceived themselves at moderate or high lifetime risk for acquiring HIV.[74] Among 267 unrecognized infections, half perceived themselves at low lifetime risk. They were more likely to report unprotected anal intercourse with male partners of unknown HIV

status.[77] In a qualitative study, the perception of personal responsibility was associated with a reduction of risky sexual behaviours in HIV infected MSM.[78]

31. Effective treatment with highly active antiretroviral therapy (HARRT) has prolonged the life of HIV/AIDS patients. From the perspective of infectious disease epidemiology, HARRT may lead to an increased number of HIV positive MSM who can potentially transmit the virus to others. More importantly, some MSM may become less concerned about HIV because of the availability of treatment. A survey in Chicago revealed that 12% of the respondents had become less anxious about having unsafe sex after HARRT.[79] The reduced HIV concern was shown to be an independent predictor of unprotected anal sex with HIV positive partner and number of sexual partners. Ecological study in US also supported the association of increasing use of HAART among MSM (from 4% in 1995 to 54% in 1999) with unprotected anal intercourse and multiple partners (both increased from 24% in 1994 to 45% in 1999).[80] During similar period, the annual HIV incidence rate among MSM has doubled from 2.1% in 1996 to 4.2% in 1999.

32. Several subgroups of MSM may be more susceptible to HIV transmission: First, a Canadian study compared MSM who were also IDU (MSM/IDU).[82] MSM/IDU were younger, more likely to be HIV-seropositive, had casual sex partners and female sexual partners, had unprotected receptive anal intercourse with casual partners and had engaged in commercial sex. Second, men who have sex with men and women (MSM/W) were more likely to report more than 10 sex partners in the past year or have sex partners who were also MSM/W.[83] Sexual network analysis suggested MSM/W occupied a central position in the sexual partner network. Third,

within a community, different ethnic groups might have variable level of HIV risks owing to the differences in social norms and behaviours. For example, African-American MSM were more likely to be HIV positive, less open about sexual orientation, more likely to have female sexual partners and more inclined to use cocaine with sex.[84] However, there is limited information on the recent trends of these subgroups and to what extend they contribute to the epidemic.

2.6 HIV infection among MSM in Hong Kong (Appendix B)

33. The actual number of MSM in Hong Kong is not known. In a local population-based telephone survey of 14,963 men between 18 to 60 years old, 4.6% of the respondents reported ever engaging in MSM activity.[85] In the 6 months preceding the survey, nearly half of these MSM had sex with another man (active MSM), of which one-tenth had anal sex. Extrapolating the observation to the population of Hong Kong at end-2006 [86], the estimated number of adult MSM aged 20 to 64 years is about 100,000 and active MSM is 44,000.

34. There is no regular surveillance of HIV prevalence in MSM in Hong Kong. Data from (a) voluntary reporting to Department of Health, (b) statistics of Kowloon Bay Integrated Treatment Centre, and (c) HIV testing results from non-government organization provide information on the trend of the infection.

35. As of the end of 2006, the cumulative number of HIV infection acquired through homosexual or bisexual contacts was 804, accounting for 25.1% (804/3198)

of all HIV cases reported to the Department of Health.[87] A rising number of reported HIV infection acquired through sex between men was observed in the recent 3 years. The annual number of HIV infection in this category in 1995, 2004 and 2005 was 30, 65 and 96 respectively (Box 26, Appendix B).

36. The ratio between HIV infections acquired through homo/bi-sexual route and heterosexuals has changed over the years. In the late 80s, half of the reported HIV infections were MSM (Box 26, Appendix B). This proportion gradually dropped to below 20% in late 90s. In 2005, the proportion rose again, and in 2006 (up to 3rd quarter) it accounted for 29.5%. In contrast, the proportion of heterosexually acquired HIV infection dropped significantly in the past decade from 64.6% in 1997 to 33.1% in 3rd quarter of 2006. This results in reversion of the ratio of heterosexual men to homosexual HIV infection reported in 2005 (Box 28, Appendix B).

37. A majority of the reported HIV cases in MSM were aged 25 to 44 years in the past 10 years. There was a steady increase in HIV infection reported in this age band while the number of infection among other age groups has remained essentially stable (Box 29, Appendix B). Most of the reported cases were Chinese.

38. Over the years, AIDS Concern (a non-governmental organization) has been offering HIV tests to MSM in Hong Kong. The number of tests performed has increased from 38 in 2000 to 483 in 2005, while the percentage of positive tests has also increased from 0% to 2.28% respectively (Box 25, Appendix B). This finding may have over or under-estimated the true prevalence depending on the motive of MSM in accessing the tests. Nevertheless, the increase in HIV prevalence in MSM

had paralleled the trend observed in the reporting system. Moreover, the prevalence of HIV among MSM was also consistently higher than that in other risk categories (0-0.83% in drug users, tuberculosis patients, prisoners and pregnant women) tested by unlinked anonymous screening from 1997 to 2005 [88].

39. About 60% of all reported HIV patients in Hong Kong are managed at the Kowloon Bay Integrated Treatment Centre. Service statistics provides useful clues as regards the pattern of infections in MSM. Between late 1999 to 2005, the proportion of HIV patients who were MSM had risen from 30% to 42%.[89] In this population, two-thirds considered that they had contracted the virus through non-regular, non-commercial sex partners while one-fifth believed that they were infected from their regular partners. (Box 31, Appendix B) Eighty percent suspected that Hong Kong was the place of infection and 12% thought that it happened in South East Asian countries (Box 32, Appendix B).

40. Molecular epidemiology studies in Hong Kong revealed that HIV subtype B, which circulated predominantly among MSM, has risen from 29.4% in 2003 to 35.1% in 2004 and 39.7% in 2005. This finding was reinforced by the report of detection of two clusters of 46 cases with closely related sequences in 2006.[90] These cases were reported to DH between November 2003 and September 2006, which coincided with the rising trend detected from various sources. Thirty-four out of 46 (73.9%) were known to have been infected through homosexual or bisexual contacts. Epidemiological investigation of a subgroup of ten cases revealed that 8 suspected they got the infection from non-regular, non-commercial sex partners, 7 had used internet to source sexual partners and 4 had used soft drug during sexual activities.[91]

Detection of these clusters suggested that there was active transmission of HIV in MSM in the last 3 years.

2.7 HIV associated behavioural risk factors in Hong Kong

41. HIV transmission in MSM is associated with the practice of risk behaviours, notably unprotected anal sex, the pattern of which would have predated the HIV trends. A rising prevalence of the practice of such behaviours, if present, could explain the HIV trend seen in reporting and prevalence studies.

42. Having multiple sex partners is not uncommon among MSM. In the study by Lau, 23% MSM engaging in anal sex had three or more non-commercial partners in the preceding 6 months (Lau et al, 2004a). About one-third believed that their partners also had other sex partners. Commercial sex was however relatively less common. About 19% had had at least one commercial sex during the previous 6 months.

43. Different condom usage rates were reported in a variety of studies, ranging from 33% to 94%. Among the clients attending government AIDS counseling and testing service, 40% to 60% reported regular use of condom with regular or casual partners (Box 30, Appendix B). In a population-based study, 42.9% always used condom with any non-commercial partners. [85] Some 44% of the MSM engaging in anal sex had used condoms for the last sexual contact. For those who visited male sex worker, 35.7% had always used condom. Another survey on 164 MSM revealed that 39% used condoms every time in sexual activities, while 39% used inconsistently and

22% never used condom.[92] A decreasing trend of condom usage was observed in clients of an HIV testing service organized a non-governmental organization (Box 33, Appendix B) while that in the government VCT service had remained stable (Box 34, Appendix B).

44. Despite the low condom usage rate reported in some studies, MSM do have high awareness of the need for safer sex. In the population-based survey, 84% agreed that "the use of condom is necessary when having sex with same sex partners".[85] An even higher percentage (87%) of MSM acknowledged that "condom use would reduce the chance of HIV infection while having anal sex with same sex partners". Eighty-four percent of them also agreed that "the chance of contracting HIV is very high when having anal sex without using condoms". The most important motivator for condom usage was the fear of contracting sexually transmitted diseases (43%), followed by the fear of contracting HIV (26%). Barriers for condom use included the belief that partner was HIV free (32%), condoms not readily available (26%) and fear of affecting relationship (16%).

45. The perception risk of HIV was low among some MSM in Hong Kong. In the population-based telephone survey, half (54.2%) perceived that they had no chance of contracting HIV in the future.[85] Very few MSM went for HIV antibody testing (13.9%) and joined AIDS prevention activity (6.2%).

46. The close proximity between Hong Kong and Mainland has facilitated cross-border sex not only between men and women but also among MSM. A local survey reported that 15% of MSM had engaged in sexual activity in Mainland China in the 6

month period prior to the survey.[93] They were more likely to have high risk behaviours like patronizing commercial sex workers and having three or more partners.

47. Based on the Asian Epidemic Model, a projection was made to predict the trend of HIV in Hong Kong.[94] Assuming a low condom usage rate of 60%, the model projected that MSM will account for most of the new infections in Hong Kong (Box 35, Appendix B). The cumulative number of MSM positive for HIV will increase by 3 fold within 5 years and by 2020, there will be about 15000 HIV cases. This could be averted by accelerating the condom usage rate from 60% to 80%. If no intervention was made to expand the prevention effort, the accumulated additional care cost would exceed 1 billion by 2020 (Box 36, Appendix B).

Chapter 3 MSM Risk Network in Hong Kong

3.1 From connection, transmission to infection

48. Transmission of HIV is characterized by intimate (sexual) contact between individuals. For HIV to be transmitted, people must first be somehow "connected". The one who transmits the virus must "know" the partner, no matter how loose the relationship is (e.g. in one-night stand). For many other infections transmitted through human-to-human contacts, infected individuals may not know each other. For example, a SARS patient may get infected from an unknown source within a housing estate, or a child may be infected with Norovirus in a kindergarten without knowing personally the index case.

49. The pattern that people get connected determines the dynamics of HIV transmission. Understanding the network dynamics (how people get connected) helps to explain and predict the present epidemic. This alternative perspective integrates the application of social network analysis in understanding the epidemiology of infection like sexually transmitted diseases.[95-98] However, little is known in HIV network dynamics and there is no documented study in Hong Kong.

50. Conventional epidemiological methods (e.g. questionnaire survey or case-control study) are useful to identify individual risk factors associated with HIV infection. However, they are inadequate to describe the dynamic partnership pattern of MSM. Social epidemiology is an alternative approach to describe and analyze the

complex relationship between individuals, especially in the case that a community-level aggregation is anticipated. Social network analysis is a method for describing the social epidemiology of diseases, though its application in HIV epidemiology remains limited.

3.2 The nodes and network of MSM in HIV transmission

51. MSM, not unlike other community sectors, are not connected randomly. They may be directly introduced to one another by friends. More characteristically, they are connected through some contact points or "nodes". For example, two MSM who do not know each other may meet at a bar and start friendship. The bar is a "node" where MSM get connected. In reality, complex relationships occur between MSM individuals to form an "MSM network". These networks, or sections of the network, may be characterized by engagement in sexual activities, thus exposing MSM to the risk of HIV transmission should unprotected sex be involved. Understanding this network is crucial in explaining the recent rising trend of HIV.

52. This chapter describes the characteristics of "nodes" through which an MSM may enter the network and get connected to other MSM in Hong Kong. We interviewed key informants of various sectors and organizations to understand the history, operation, potential development of these nodes. These include sauna owner, bar owner, magazine editor, website owner, a travel agent who organizes overseas tour for local MSM, workers in non-government organization for AIDS, committee member of a gay group, community leader in AIDS organization and active MSM

member. We also describe the linkage between these nodes which connect the MSM together in the network. The changing pattern of these nodes in recent years, clustering within the network and connection of the local and overseas networks are described subsequently.

53. Broadly speaking, the MSM nodes can be divided into information nodes and physical nodes. Information nodes refer to contact points through which MSM can access information relating to MSM activities. Physical nodes are establishments where MSM interact and socialize, and in some cases, have sex there. For example, some saunas or bar (physical nodes) may be publicized in the internet, the latter therefore functioning as information node. An MSM may first go online to know the place of a gay sauna and subsequently get connected with other MSM in a network through which sex occurs. Box 2 summarizes the characteristics of these nodes, activities of MSM in these nodes, their trend in the past 5 years and predicted growth in the coming 5 years. These features enable us to understand the configuration of MSM networks, the description of which demands other in-depth studies in the community.

Box 2 A description of MSM nodes in Hong Kong

3.3 Information nodes

54. In 1980s and 1990s, when homosexual activity was still a taboo, public toilet was one main venue where some MSM met and shared information. In the era of information explosion today, internet and gay-oriented magazines are popular channels for access to information. A simple search on the internet using the word "gay" yielded 394,000 outputs (by the search engine "Google", dated 8 December 2006), more than 253,000 outputs using "HIV". Over 50 local venues of different kinds (bar, sauna, massage house) were listed in the gay-oriented magazine. While some MSM are still struggling for "coming out", they are at the same time getting connected to the MSM network through accessing these information nodes.

55. Internet plays a central role as an information node. There are three main local gay websites, which provide similar functions but with different clientele. One website, for example, is favoured by young MSM. The leading website has the longest history of 7 years but it only becomes more popular since 2001. It became a hit when it captured over 6800 new users in 2003 and 7700 in 2004 (personal communication). There are also a few Taiwan and Singapore websites which are frequently visited by local MSM.

56. There are 3 key functional formats of the internet as an information node, namely, Bulletin Board System (BBS), chat room and matching for partners. Within the BBS, MSM can publicize messages one after another and discuss any issues not just related to sex. At peak hours, there are about 350 users simultaneously online at the leading website. One informant considered that about 40 to 50 users were online

around the clock in the past 2 years. As of December 2006, over 13,000 messages were posted by MSM in the BBS of one leading website.

57. Chat room provides a platform where MSM can "talk to each other" instantaneously in written words. This can be a one-to-one dialogue or an open dialogue for several users. The peak hours for these chat rooms are between 11 pm to 2am when about 200 users may be online at one time. The main purpose for many users is to look for a "casual" partner. If this is agreed on the web, they may go to an agreed venue, mostly partner's home where sex takes place.

58. The matching function allows the MSM to find a partner of interested profile (e.g. young). Users may aim at long term relationship instead of one-night-stands. This is relatively less popular but no related statistics is available.

59. In line with the situation in other parts of the world, a growing proportion of MSM had sourced partners via internet. In a population-based telephone survey, 18% reported that they had networked MSM partners via internet in the preceding 6 months.[99] They were more likely to be young (<25 years) and had engaged in anal sex (OR=3.95, 95%CI=1.89-8.23). There was association with multiple (three or more) partners (OR=4.74, 95%CI=1.89-8.23) and history of sexually transmitted diseases (OR=4.79, 95%CI=1.34-17.11).

60. Gay-oriented magazine is another popular information node. About 10 years ago, there were only 2 gay-oriented magazines in Hong Kong. They featured photos of sexy men and sex stories. In the last 3 to 4 years, two magazines have been

dominating the market for gay readers. These magazines now focus on trendy lifestyle instead of sex, but are useful source of information for physical nodes – gay venues (bar, sauna and massage house). One magazine is freely distributed in these venues, printed in 10,000 copies for each issue. Apart from the local magazines, there are also a few overseas magazines sold in audiovisual shops in Hong Kong.

3.4 Physical nodes – the establishments

61. Public toilets used to be one of the core places where MSM met and got acquainted with sex partners in the past two decades. Some might also have oral and/or anal sex inside these toilets. Before decriminalization of homosexuality in 1991, MSM were liable to be taken to court if such activities were discovered by police. The situation has since changed. Coupled with the increased popularity of internet networking and the availability of a variety of other preferred venues, public toilets have become much less popular. At present, only a few public toilets are preferentially visited by middle aged or older MSM.

62. Sauna has largely replaced public toilets as one of the main venues for sourcing sex partners in MSM and for sex. In 1996, there were only about 13 saunas. The number then increased gradually and has come to a plateau. Currently, there are some 22 saunas distributed mainly in Tsim Sha Tsui, Causeway Bay and Wan Chai. A survey conducted by AIDS Concern in 2001 on 609 sauna users revealed that over half (53%) made the visit more than once a week.[100] Twenty-seven percent had six or more sex partners in the 3 months prior to the survey. In the last few years,

however, fewer MSM went to saunas for sex because some could find partners through the web and did not need to pay the admission fee for saunas.

63. Each sauna normally entertains a different category of clientele, for example some catering fat guys, others for teenagers or those aged 50 to 60 years respectively. The capacity of most saunas is less than 100 and they normally have at most 30 to 40 MSM at one time. The normal peak hours range from 6 to 9 pm. A few saunas open round the clock but only on Saturdays. The establishments typically consist of a reception area, a lounge area, changing rooms/shower facilities and cubicles with lockable doors where sexual activities may take place.

64. Free condoms and lubricants are regularly provided by an NGO (AIDS Concern). About half of the saunas display the condoms in individual cubicle. Other saunas place the condoms in the main lobby and the clients can pick them up before going for shower. In the survey conducted by AIDS Concern in 2001, 67.8% of MSM always used condom when they had sex in sauna.[100] Observation by individual sauna owner suggested that the proportion may be up to 80%.

65. The number of massage houses has doubled from 5 to 10 in the recent 3 years. MSM may choose to go to massage house instead of sauna as sex service is provided by the former which is staffed for the service. There is a room for growth as long as the customers are willing to pay for sex. The pattern of condom use in these settings has not been described.

66. Currently, there are about 10 bars and 5 karaoke's for MSM and the numbers

are relatively stable. These are places for chatting and socializing but normally not for sex. Occasionally, commercial sex workers may go to a bar for "fishing" (finding customers) during weekends or when there's special promotion in the bar. Similar to saunas, each bar tends to have different clientele.

67. In recent years, parties have become hit activities among MSM, especially the younger ones. About 400 to 500 persons participate in each party, which occasionally may capture 800 to 1000 party-goers. They are held in disco which may not be MSM oriented on non-party days. Parties are held on average of twice or thrice per month in various venues. It's estimated that around one-third of the party-goers would have sex during or after the parties. They may also use soft drug (e.g. Ecstasy) and Viagra to increase excitement. In the recent 1-2 years, fewer parties were organized because of police's raid. Some parties have turned underground and become smaller in size (200 to 300 persons).

68. Some MSM organize small scale "home party" or "group sex party" that usually involve less than 50 persons. These gatherings may have a special theme each time and are held either at home or hotel. These parties become more common after 2003 and are favoured by MSM who do not have regular partners. High risk behaviours such as group sex, alcohol drinking and use of soft drugs are common.

3.5 Other nodes

69. Several beaches and public swimming pools are particularly favoured by

some members of the MSM community. Most MSM go for visual enjoyment but some may find partners and have sex inside the changing rooms. These are much less popular activities compared with parties.

70. Some gymnasiums are becoming popular places for MSM. Some may have sex within changing room. There are also book stores which are gay-oriented but this has dropped from 5 to only 2 in recent few years. Apart from gay-oriented magazines, they also sell audiovisual products like DVD.

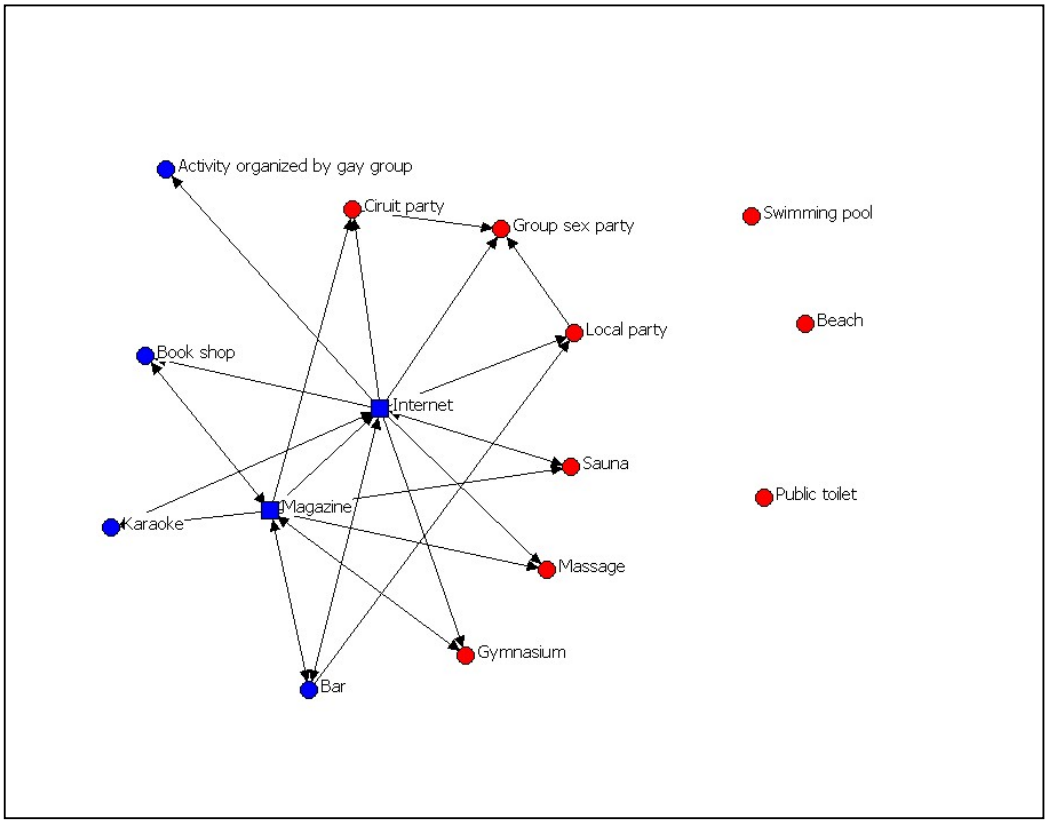
71. Gay groups can be considered as one form of "nodes". Less than 10 gay groups have been formed in Hong Kong during the past 20 years. Most of the groups are formed to consolidate relationship between members. MSM join the groups for socializing or finding partners but normally not specifically for sex. The groups organize various social activities like barbeque, sports, dating and tea gathering. Some groups have been formed for specific objectives – providing hotline service, religious gathering, advocating for equal opportunity. One leading gay group formed in the mid-1980s had about 1000 members during the active period from 1990 to 1997. About one-fifth was active members and about 30 persons joined the activities each time. Gay groups have generally become less active since 2000 following the popular use of internet.

3.6 Changing pattern of networking through MSM nodes in Hong Kong

72. Box 3 shows the linkages between the MSM nodes. The interaction between

nodes is directional, i.e. an arrow from A to B indicates that information or specific form of relationship flows from A to B. For example, the gay websites may provide a platform to publicize local parties. Hence, an arrow is drawn from “Internet” to “Local Party”. Similarly, karaoke may provide access to internet and gay-oriented magazine. At a local party, a group of MSM may start to know each other and subsequently they organize a small group sex party. There are some isolated nodes that generally do not have interactions with others. These include public toilet, beach and swimming pool which are probably unlinked to other nodes. Box 4 lists out the interaction between these nodes. “0” means no interaction between two nodes.

Box 3. Interlink between nodes in MSM Network



Box 4 Interactions between MSM nodes in Hong Kong

73. The changing pattern of networking is illustrated in two diagrams (Box 5 and 6). In these diagrams, the size of the node is proportional to a rough estimation of the number of MSM linked with these nodes. A decade ago, there were relatively fewer MSM nodes and little linkage between them (Box 5). The emergence of internet, parties and saunas have strengthened the connection between MSM (Box 6). The increase in connections facilitates development of relationship and sex, which used to be tabooed in the past decade.

74. To demonstrate the potential impacts of the changes of the profile of MSM nodes, a simulation is made by "adding" 100 MSM to the hypothetical MSM network (Box 7 and 8). In the diagrams the black dots represent the "nodes", red dots are the HIV positive MSM and grey dots are the HIV negative MSM. Assuming that behavioural risk levels (practice of anal sex, condom usage rate) remain constant, the increased linkages of nodes would cause an intensification of interactions of MSM. Increasing density of the partnership may facilitate the transmission of HIV in the community, should the virus be already in circulation.

75. The interaction between MSM within the network is not homogenous. Some MSM are much more active than the others. In the population telephone survey, about one-quarter was classified as active MSM (having sex within past 6 months before the survey).[85] Among the sauna users, 7.2% were much more active (had more than 10 sex partners within 3 months) than the others.[100] It is likely that the MSM network is separated into different smaller sub-networks which feature active sexual activities, which may or may not be linked with sub-networks. Existence of "high risk" sub-networks is supported by the detection of cluster of HIV confirmed by molecular

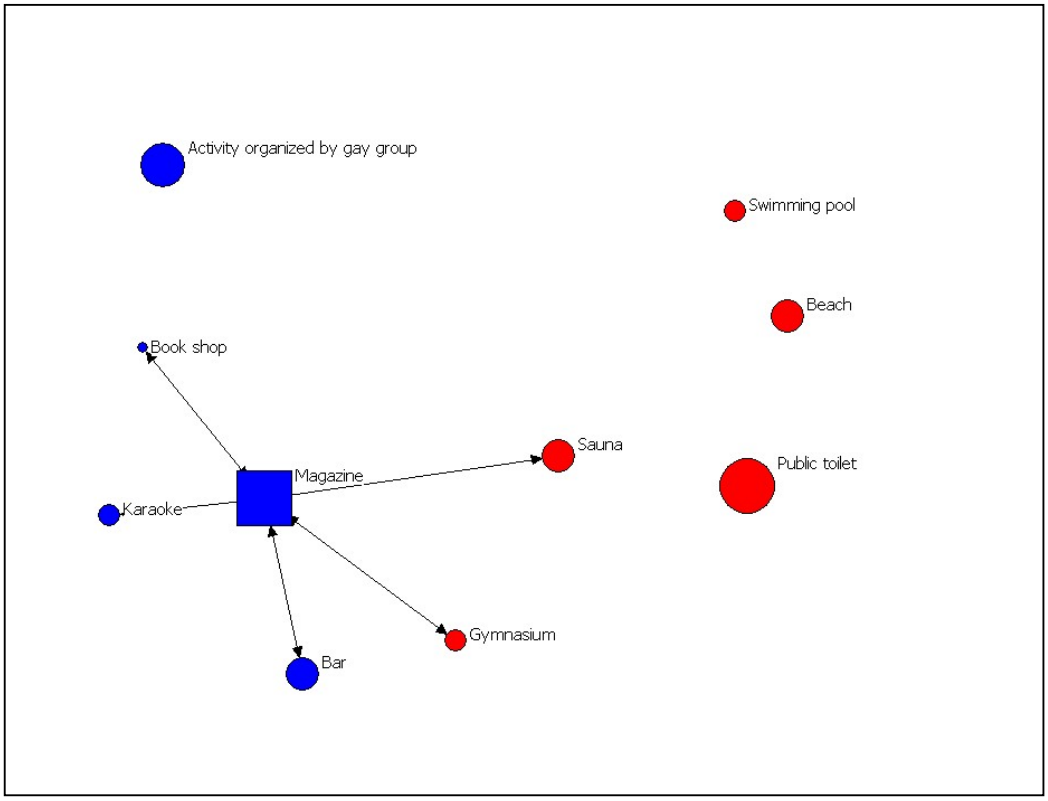
epidemiology in 2006. HIV can be easily transmitted within the cluster if MSM practise unsafe sex. The infection can also be spread from one cluster to another since the clusters are linked by various nodes.

3.7 Linkage with networks outside Hong Kong

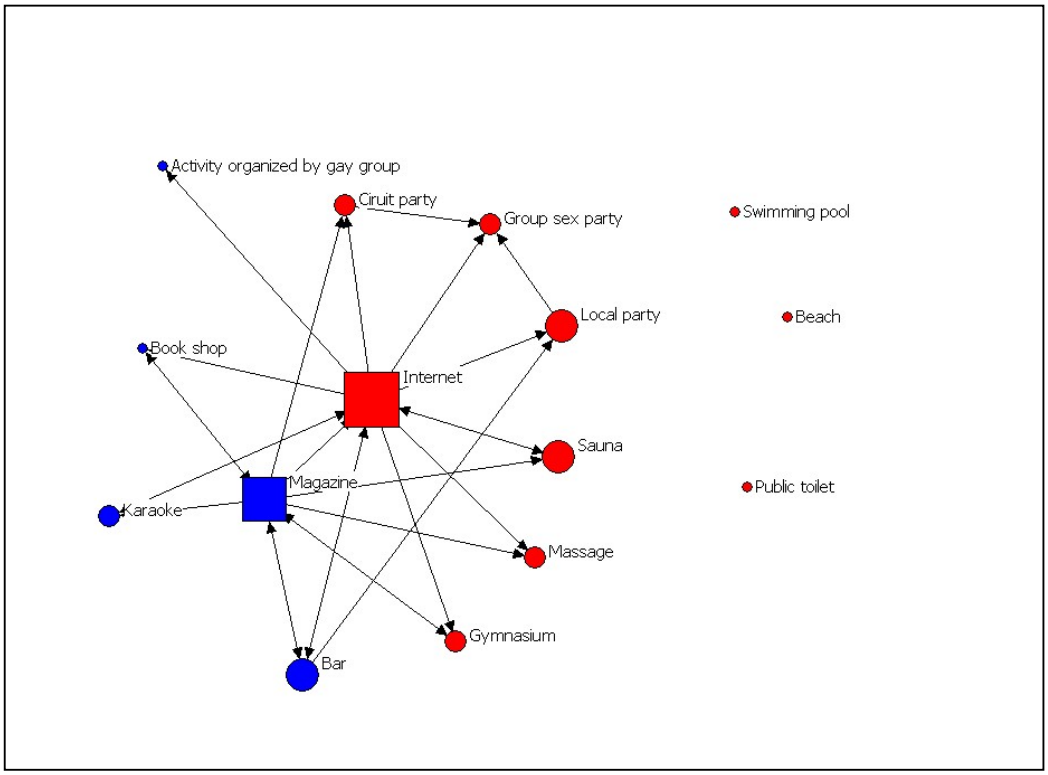
76. Travel to Southeast Asian countries among MSM has become increasingly popular in recent three years. Thailand, Taiwan and Japan are the most popular places while Australia, Philippines and Korea are less frequently visited by MSM from Hong Kong. There are travel agencies in Hong Kong which help MSM to plan itinerary. During these tours, MSM usually visit gay bars, saunas and massage houses. Commercial sex in Thailand is very common.

77. Large scale international parties are also becoming popular in recent few years. There are “circuit party” that rotates between various places in Asia, including Hong Kong, Singapore, Thailand and Taiwan. The number of participants involved can be as many as 5,000 to 6,000 persons. Use of soft drug is extremely common in these parties which keep the drive for high energy dancing.

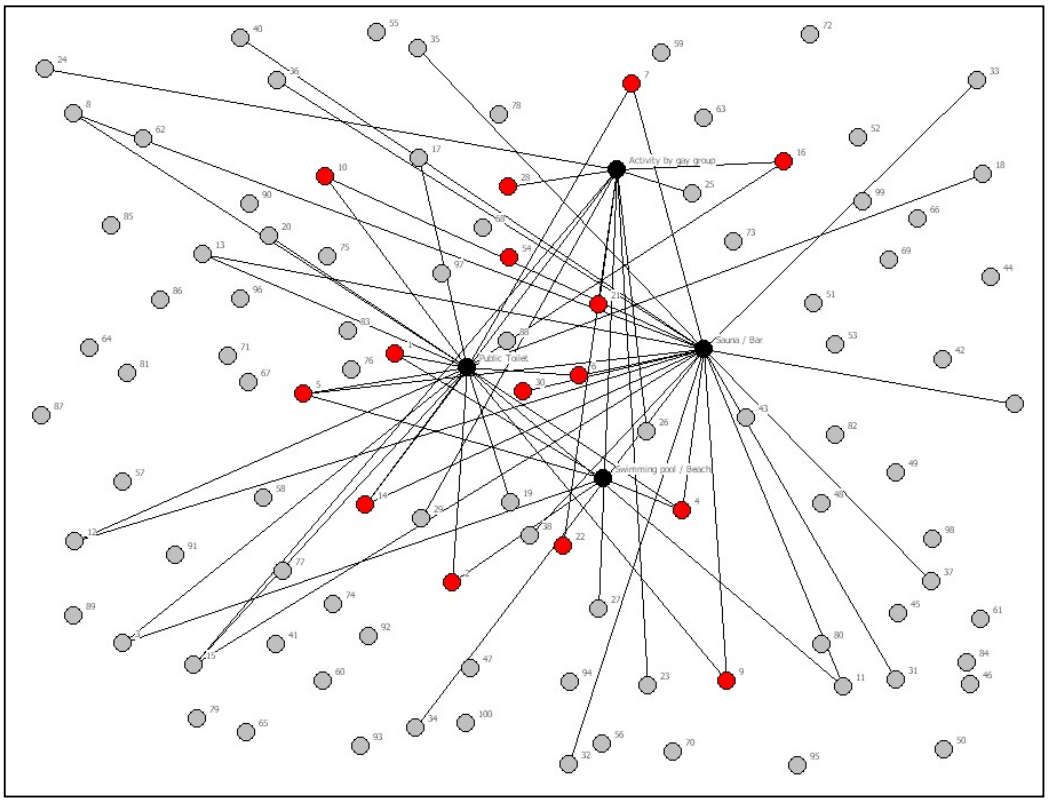
Box 5. MSM risk network in the past decade



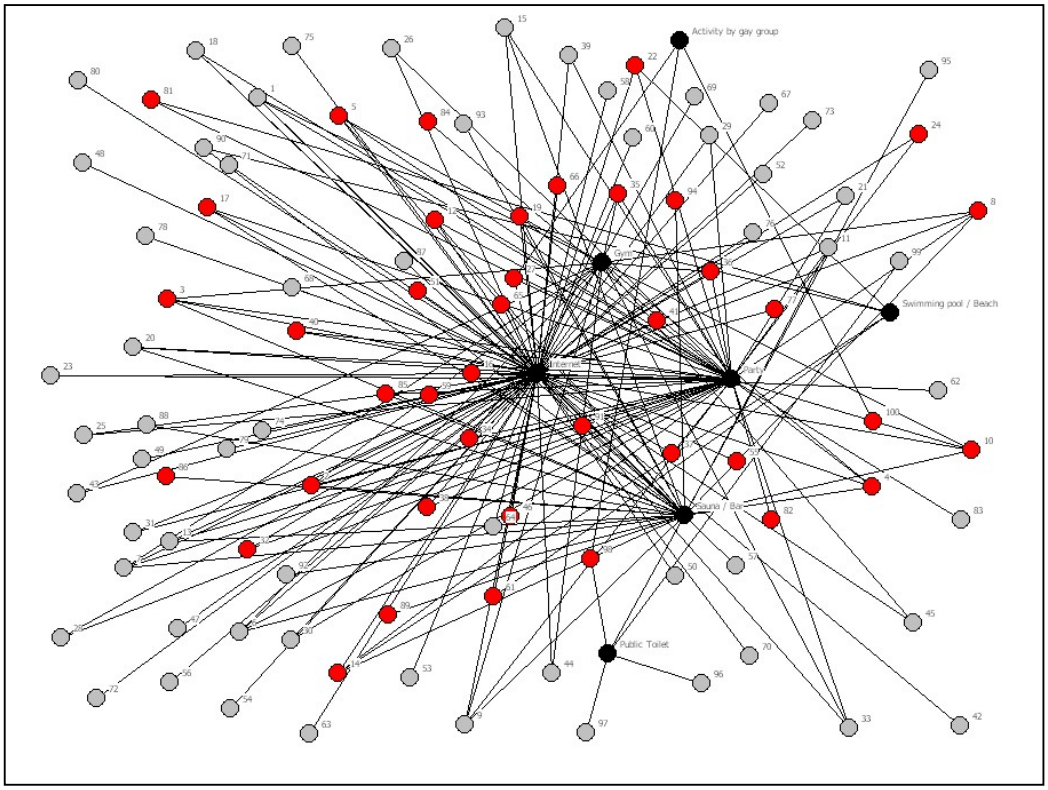
Box 6. The present MSM risk network



Box 7. Simulated MSM risk network in the past



Box 8. Simulated MSM risk network at present



78. Frequent traffic between Hong Kong and the Pearl River Delta Region has facilitated sexual activities between MSM in these places. Shenzhen, Guangzhou, Macao and Zhuhai are places where MSM in Hong Kong commonly go to. Apart from disco, bar and sauna, massage house is also a popular venue. Sex usually involves money and there is good supply of sex workers. It is particularly favoured by some middle aged local MSM since it is less expensive compared to Hong Kong. Sex may take place in hotel and soft drug may be used. It is speculated that the risk perception among MSM and commercial sex workers in these cities may be poorer than in Hong Kong.

Chapter 4 Changing Pattern of HIV Vulnerability in MSM

4.1 Introduction

79. In Hong Kong, HIV transmission in MSM occurs largely through unprotected sex between men. Injection drug use, though an efficient means of HIV spread, has not been a main mode of virus transmission. There's no evidence to suggest that injection drug use (normally referring to heroin) has occurred in a significant extent in MSM communities in Hong Kong. An MSM's own sexual practice is therefore considered the ultimate predisposing factor to HIV transmission, though this is shaped by the partnership patterns as described in the last chapter.

80. The observed increase in HIV prevalence and reports in MSM has prompted us to examine attitudes and sexual practice of HIV infected MSM prior to their infections. This chapter summarizes their characteristics, focusing on the possible change over the past years. The analysis has been generated largely from the results of a self-administered questionnaire survey conducted at the Kowloon Bay Integrated Treatment Centre and Special Medical Service of Queen Elizabeth Hospital during an eight-week period between November 2006 and February 2007. The questions were set after taking reference from the results of the qualitative study conducted among HIV positive patients (Appendix C) and interview with key stakeholders in the MSM community (Appendix E). The survey methods and statistical results are reported in Appendix D.

81. A total of 198 MSM (131 MSM from ITC and 67 MSM from QEH) were successfully interviewed, with a response rate of 90.0%. One hundred and eighty MSM were included in the analysis. Thirteen non-Chinese who completed the survey were excluded in the analysis. We arbitrarily divide the interviewed HIV positive MSM into two groups in accordance with one's speculated year of infection, using the year 2001 as the cut-off. The year was selected because many of the observations in the change of patterns of the nodes, popularity of internet use, and the rise of HIV prevalence have occurred at the turn of the century. Eighty-three (48.0%) were infected on or after 2001 (or recent infections), while 97 (52%) had contracted the virus before 2001.

82. Apart from the demographics of the study participants, we examined their (a) source/setting of infections (b) setting of diagnosis, (c) sexual behaviours and practices in the three years preceding infection, and (d) sexual behaviours and practices in 2006, if infection has occurred prior to that year. There was no demonstrable difference between MSM recruited from the two clinics. Analyses were made by combining the data as a single cohort.

4.2 Who were the infected ones?

83. The mean age of the HIV positive MSM was 40.1 years (range: 21 to 74 years). A majority (79.7%) were working full-/part-time or was student. Some 37.2% have attained post-secondary education or above. About one-third (34.4%) was living alone. Since only Chinese were included in the analysis, ethnic difference cannot be

determined. Overall, there was no significant difference in demographic between the respondents and the results of the 13 non-Chinese excluded from the analysis.

84. One concern raised by people working on HIV/AIDS was the possible decrease in the age of newly diagnosed MSM. In our study, whereas the current age of the respondents was higher in those infected before 2001, there was no decline in the age of infection. We specifically explored the age trend for those infected in 2001 through 2006 but again, no decline could be elicited. However, a significant proportion (48.7%, 19/39) of those infected in the year of 2006 was below the age of 35.

4.3 Setting of diagnosis

85. A majority (three quarters) of the patients were tested HIV positive at a public service (hospital, clinics, NGOs, Red Cross Blood Transfusion service). Only 22.2% received their first test results from a private laboratory or health service. There was no difference between those infected before or after 2001 as regards the location where the initial HIV diagnoses was made. About half of all respondents were tested for HIV because of a complication or sickness arising from the infection. Only one-fifth went for an HIV test because of a perceived risk of infection.

86. In determining the possible delay in HIV testing, a lag phase was calculated which was defined as the period between the estimated year of infection and year of diagnosis. The lag phase ranged from <1 year to 18 years. It was noted that the

median lag phase was shorter for the recently infected group (1.0 year vs 2.0 year, Mann Whitney U test; $p<0.01$), meaning that many are presenting earlier for disgnosis.

87. We examined MSM's attitude towards the initial HIV diagnosis. A majority felt disturbed on knowing the HIV status, while half considered their HIV knowledge sufficient (scoring 4-6 on a Likert scale). The questionnaire survey might not have captured the specific response to HIV diagnosis. In the qualitative study and in interviewing stakeholders, there as a falling trend of perceived uneasiness at the knowledge of the HIV diagnosis. Some specifically voiced calmly that they had expected the infection to occur.

4.4 Source of infection

88. Most (81.5%) of the recent infection cases had acquired HIV locally compared to that of 67.8% among those infected before 2001. This echoed the previous findings that the recent epidemic was due to local transmission of HIV (Box 32, Appendix B). With respect to the sex partner, a significant increase was observed among MSM who suspected they acquired the infection from causal partners instead of regular partners (from 67.8% to 81.5%).

89. We inquired if an MSM was able to link his infection to a specific source person. Some 15.6% strongly agreed (6 on a 6-point Likert scale) that they were able to do that. There was however no significant difference between the responses of people recently infected and those before 2001.

4.5 Pattern of partnership

90. Respondents were asked to select from a list of "nodes" (refer to Chapter 3) they had preferentially visited in the three years prior to their infections. In comparing between the recently infected and those before 2001, there was a significant increase in the use of Internet for sourcing sex partners, while that of toilets and beaches had decreased. For the recently infected group, internet has become the most common node for sourcing sex partners (44.6%), followed by sauna (41.0%) and bar (28.9%). There was no significant change in the proportion of MSM who identified sex partners through bar, sauna, party and gymnasium before and after 2001.

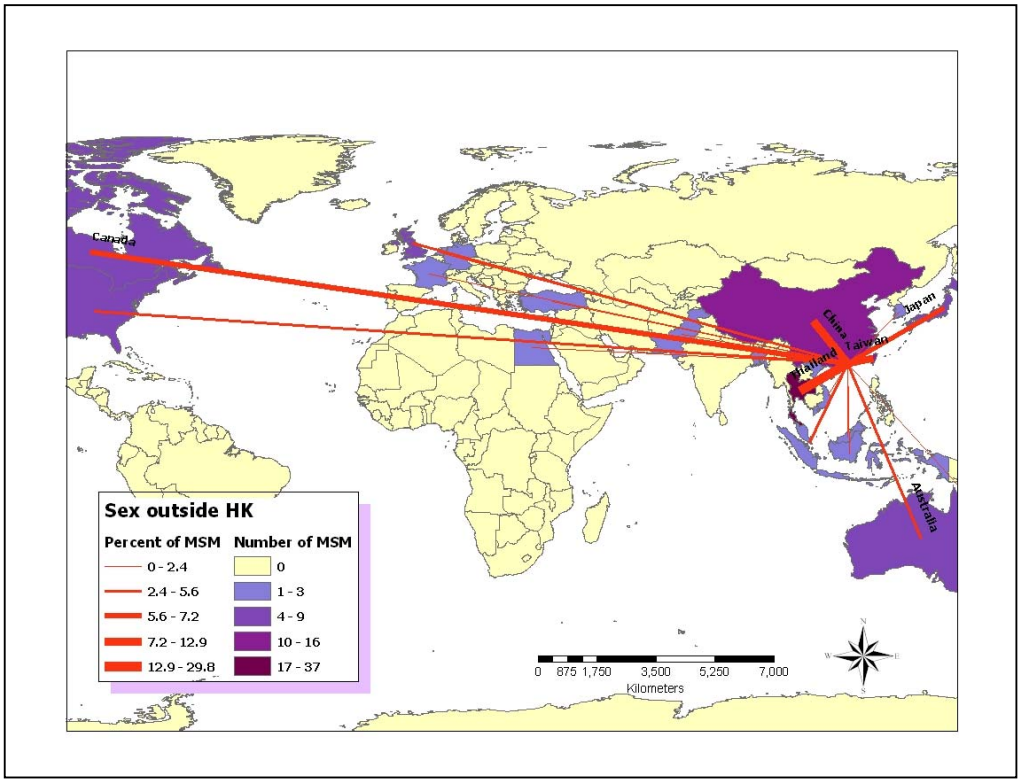
91. It is believed that some MSM have multiple casual partners even though they have already had regular partner(s). Overall, regular partners was reported by half of the respondents, 43.3% of which had more than 1 regular partner, while 85.6% had concurrent casual partners. There was no significant change in the pattern of partnership between those reported recently and before 2001. Engagement in commercial sex was uncommon throughout, with 84.4% never having patronized commercial sex workers.

92. Assortative mixing is defined as the partnership between people with similar background, for example, ethnicity and age. Dis-assortative mixing is considered a risk factor of HIV transmission, as the virus would be passed on from one network to another. In the study, a majority (62.7%) had sex with others of the same age (less

than two years' difference), and mostly within the circle of Hong Kong Chinese (81.5%). Changes in this pattern of assortative mixing have not been seen.

93. About half (51.1%) reported having had sex outside Hong Kong. The most popular countries were Thailand, Taiwan, Mainland China and Japan. There was no major difference in the choice of countries before and after 2001. The differential in HIV prevalence between these countries and Hong Kong is a potentially important factor for HIV transmission on an international level. [9]

Box 9: Countries visited by Chinese MSM from Hong Kong (The red lines represent the spatial linkage of HIV positive MSM with sex partners outside Hong Kong, with thickness demonstrating the proportion of cases and the colour showing the absolute number of respondents having sex in the country)



94. Location for sex in MSM is important as this may affect the development of intervention strategy. Compared with MSM infected before 2001, those infected recently were more likely to have sex in their own or partners' homes. This was consistent with the observation that more people identified sex partners through internet followed by sex at home. Internet users were 3 to 5 times more likely to have sex at their own home or partners' home, compared to non-users. Fewer MSM reported having sex in public toilet and beach in recent years, but the difference did not reach statistical significance, probably due to the small sample size. The prevalence of sexual activities in sauna, hotel and party was not significantly different between the two time periods.

95. We compared the practice of three forms of sexual activities – anal, oral and mutual masturbation. Overall, the frequencies of each form of sexual activities have remained similar across the two time periods. A majority were frequent condom users (4-6 on a 6-point Likert scale) for anal sex (67.6%) but not for oral sex (16.9%). There was no change in the rate of condom use before and after 2001. Importantly, internet users had a higher frequency of anal and oral sex, but they were more likely to use condom while having anal sex.

96. Condom use with regular and casual partners was compared. Condom use was commoner for anal sex (76.2% overall; 53.2% with regular partners), with "common use" defined as points 4-6 on a 6-point Likert scale. Unprotected oral sex was prevalent (79.7% overall and 85.9% with regular partners). Again, there was no change in the pattern across the two time periods.

97. We distinguished two forms of sex roles in anal sex – active and passive. The proportion of respondents that took on the active role in most cases (4-6 on a 6-point Likert scale) was 46.9%, and this had not changed over the two time periods. The pattern of sex role (active or passive) has not been changed in the past few years. A significant increase in the use of soft drugs in conjunction with sex was observed (26.3% vs 10.1%).

4.6 Identity formation and risk behaviours

98. Identity formation is the process of acknowledging and living with one's own sexual inclination, which refers to that of homosexuality in context of our assessment of HIV risk through man-to-man sex. In the current study, the mean age of MSM recognizing homosexuality was 17.3 years (SD: 6.7 years). The age of first sex was 21.1 years (SD: 6.8 years). When an MSM had first sex, 82.0% had masturbation and 23.0% had anal sex.

99. The mean age of coming into contact with the MSM network was 22.9 years (SD: 7.4 years), which was almost identical to the mean age of first anal sex. This was about 5 to 6 years after a person recognized himself as homosexual. Some 34.7% first went to public toilet and 21.0% to bar. This time-space sequence offers unique opportunities for targeted safer sex education before MSM became sexually very active.

100. There was no apparent change in the timeline of identity formation across the two time periods of recent infection and that before 2001. When one had his first anal sex, 59.9% assumed a passive role. Nearly 80% agreed that they were certain about their sexual orientation when they had first anal sex. There's the observation that the predominant sex role (active or passive) adopted during identity formation was likely to be the prevalent role in adulthood. The relevance and consistency of this observation would need to be established in other studies.

4.7 Safer sex practice after HIV diagnosis

101. The survey has enabled us to assess the prevalence of risky behaviours after HIV diagnosis. Patients whose infection occurred in the year 2006 were excluded in the analysis. Comparing individuals' behaviours in 2006 with that 3 years before the infection, there was a significant reduction in the practice of sourcing sex partners in all venues (toilet, bar, sauna, beach and gym) except internet and party. There was, likewise, significant reduction in sexual activities in public toilet, sauna, hotel, party, beach and partner's home.

102. Protected sex, as defined as the use of condom, had increased. The condom usage rate for anal sex was higher after diagnosis while the frequency of patronizing commercial sex workers fell significantly. Apparently, MSM generally reduced their risky sexual activities after diagnosis of the infection. As all patients have been recruited from HIV specialist clinics, the observation might have been biased, though

the contribution of clinic-based interventions could not be ignored. It was beyond the scope of this study to establish the reasons behind the observation.

Chapter 5 Conclusions and Recommendations

5.1 Conclusions

103. At the beginning of the report, we hypothesized that there could be three overlapping reasons for explaining the observed rise in HIV prevalence and reports of HIV infection in MSM Hong Kong. These are: firstly, increase in the practice of risky behaviours, notably unprotected anal sex; secondly, increase in the number of MSM; and thirdly changes in the configuration of MSM network in the community exposing individuals to the risk of HIV transmission. We conclude that changes in the partnership pattern, reflecting the evolvement of configuration of MSM network, have been the main force behind the observed trend.

104. The changes in partnership patterns was precipitated by the rising popularity of internet use for sourcing sex partners, an phenomenon clearly evident from our questionnaire survey, qualitative study, and interviews with stakeholders. This underlying force of internet has caused the same changes in other parts of the world, as elicited in the literature review. We conclude therefore also that the change in partnership pattern in Hong Kong is similar to what has been happening in western countries and South East Asia.

105. At the heart of the partnership among MSM are a number of access points, which we refer as “nodes”. Whereas internet has assumed the central role of an information node that links MSM to one another and to various establishments

(physical nodes), the preference of physical nodes has changed dramatically over the years. Public toilets and beaches have become less popular while sauna has continued to be a preferred avenue for sourcing partners and for sex.

106. The popularity of the use of the internet has two other implications (a) higher frequency of sexual activities including anal sex, and (b) the new phenomenon of having sex at home. The new challenges are therefore the need for innovative strategy in promoting safer sex through internet and at home!

107. While unsafe sex on an individual level is the ultimate predisposing factor to HIV transmission, our study has not revealed any definite increase in the practice of risky sexual behaviours, namely, unprotected sex and anal sex. There was however an increasing use of soft drugs while having sex, and the association of such behaviours with participation in parties, especially group sex parties. The relevance of such activities to HIV transmission is yet to be explored.

108. We have examined the process of identity formation and practice of risk behaviours in MSM. In the cohort of HIV infected MSM, they identified themselves as homosexual at around the age of 17, came into contact with the MSM network and had first sex at about 23, and subsequently got infected at an average age of 30 years. With the popular use of internet, it's possible that more MSM became attracted to the network. Whereas the absolute number of MSM in a society is probably constant, the proportion that is eventually drawn into an MSM network (and in some cases, high risk sub-network) would likely increase.

109. Finally the clinic where HIV positive MSM are seen has continued to be an important source of reference. Over the years, there's a tendency for earlier diagnosis to be made. The lag phase between infection and diagnosis has shortened. This may have resulted from the promotion of HIV testing by the Government and the community. There is however the more worrisome phenomenon of an attitude of indifference to HIV infection in the MSM network. Apparently, risk perception may be an unimportant context for promoting safer sex if MSM do not perceive HIV transmission as a risk. Cognitive escape and thought suppression are psychological dimensions that may need to be explored in the planning of intervention strategies.

110. Finally, it's encouraging to note that the risk profiles of HIV positive MSM have improved significantly after HIV diagnosis. It is however not known if such improvement is associated with clinic attendance, perception of one's responsibility, change of configuration of MSM network, partnership patterns or other psychosocial factors. Neither are we certain about the sustainability of such improvement.

5.2 Limitations of our studies

111. Our conclusions are drawn from a review of local and overseas literature, interviews, qualitative study and questionnaire survey. A large part of our observations has been derived from our assessment of HIV infected MSM attending two HIV specialist clinics in Hong Kong. There is the potential selection bias though it's believed that a significant proportion of HIV positive MSM do register with these

clinics. We believe that the risk profiles and partnership pattern could be extrapolated to that in the community (non-infected), though further studies are clearly needed.

112. In our studies we have used both qualitative and quantitative approaches to allow us to explore the subjects in depth and in context. The self-administered questionnaires were completed with the support and in the presence of research staff, which enhanced the validity of each completed form, but may have created another layer of bias.

113. Finally, we have paid special attention to the networking patterns of MSM with the incorporation of social network analysis. Social epidemiology is a perspective that has been neglected in HIV epidemiology studies. Knowingly such application was not planned at the beginning of the project. Only preliminary results could be provided, the validity of which shall need to be substantiated in specifically designed research in due course.

114. As for recommendations, we limit these only to what we can derive from our observations and conclusion. Understandably the scope of such recommendations is bound by the study framework. We are sure that parallel efforts of other researchers, public health authority and the MSM community will be complementing our efforts. We make no claim that these are the only means of addressing the problem.

5.3 Recommendations

115. Based on the results of the studies described in this report, a number of recommendations are made for the consideration of the Government and the community in meeting up the challenge of the observed increase in HIV in MSM in Hong Kong.

116. Firstly, there are two specific periods that preventive measures could be introduced each using a different strategy. The first period is between the age of 17 and 23 in the process of identity formation but before one comes into contact with the MSM network. Safer sex education on a general level would be crucial, while taking into consideration the psychological needs of a young person during the phase of acknowledging his sexual inclination. The second period is that between 23 and 30, when connection with MSM network begins. This is also the golden opportunity for introducing targeted intervention with regards to the use of different information and physical nodes in the territory and beyond.

117. Secondly, specific interventions shall be designed that target MSM who source sex partners through the internet and have sex at home. Posting safer sex messages through internet could be an effective means, coupled with the design of activities that involve peers online and offline.

118. Thirdly, strategies that target the indifference of some MSM to HIV infection are warranted. Instead of promoting awareness of HIV transmission, there would be the need to promote sexual health by incorporating such issues as sexually transmitted diseases (STD) in context of risk perception. After all, the best HIV prevention message does not necessarily be repeating the word “HIV” as fatigue may follow, but

rather things that MSM are concerned about. The fostering of a responsible attitude towards sex could be used as complementary strategy.

119. Fourthly, clinic-based intervention is effective in reducing risky sexual behaviour of HIV positive MSM. Opportunistic counseling on safer sex practice should be strategically packaged. These should be organized systematically as a public health programme within a clinical service. Parallel evaluation and research would enable new knowledge to be learned and conveyed to clinical services to improve the effectiveness of the approach.

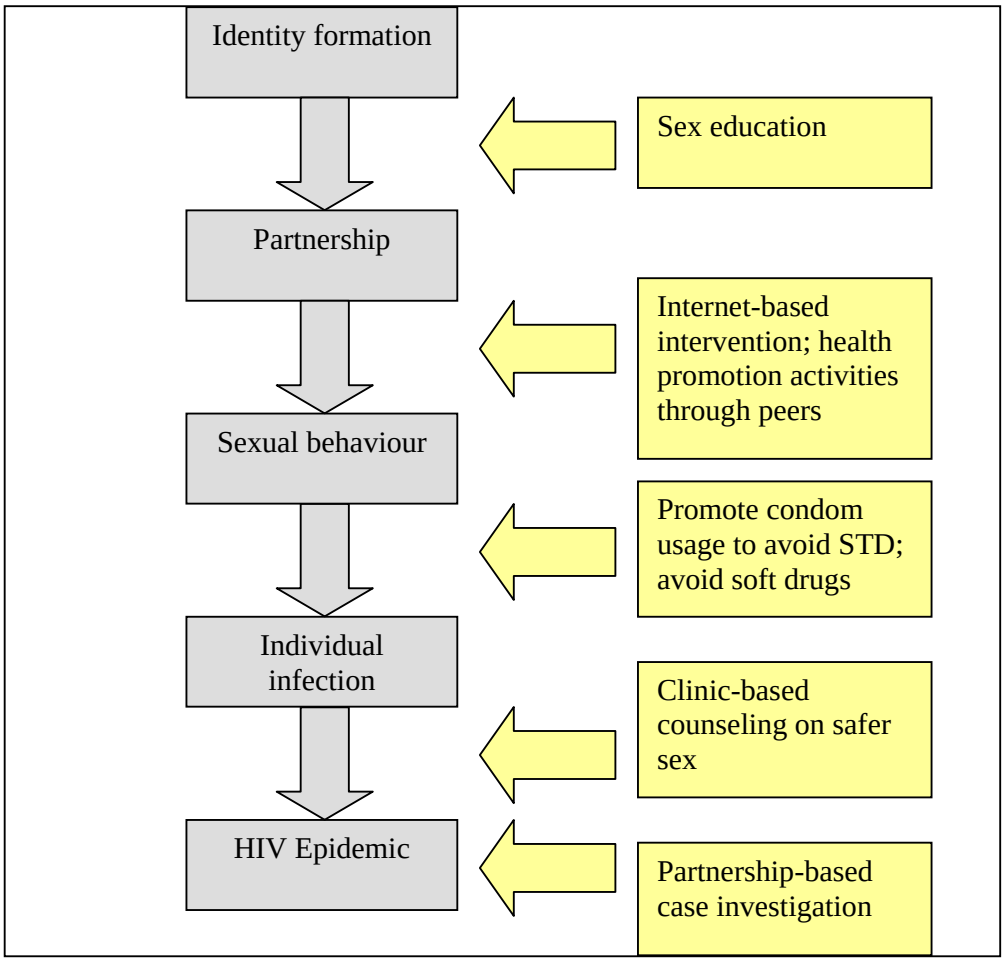
120. Fifthly, while there's no demonstrable increase of risky behaviours in MSM, it's important to address new forms of behavioural practices that may put MSM at risk of HIV transmission. By these we mean the phenomenon of the use of soft drugs, participation in parties, and spatial linkage with MSM networks in other parts of the world. As an example, pilot projects that link intervention in soft drug abuse and safer sex promotion are advised. Epidemiologic (social and molecular) studies linking MSM situation in different countries would be important in informing strategy development.

121. Finally, we are reminded that HIV is an infectious disease, and case investigation would be invaluable to support tailored public health interventions. Unlike SARS and influenza which often spread efficiently without the index cases being known, HIV is a chronic infection that requires close partnership between individuals before dissemination is possible. Careful case investigation can shed light on the partnership patterns, the transmission dynamics, and the identification of

clusters for facilitating the development of control measures. The principles are no different from active case findings and outbreak investigation in other communicable diseases, though the specific methodology may vary. The window of opportunity is still with us, knowing that the HIV prevalence has remained low despite the rising trend.

122. Each of these recommendations target at specific stages in the course of HIV infection and epidemic. They are summarized in Box 7:

Box 10. Recommended interventions for HIV prevention at different stages of the disease



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Appendices

Appendix A Literature Review Report

Aim

1. The aim of this literature review is to assess the epidemiology of HIV among MSM, with a focus on determining the factors underlying the rising trend in recent few years.

Methods

2. Different data sources were explored to obtain the relevant information. These included a systematic review of the literature (using MEDINE and EMBASE), search for relevant documents of international health organizations (Jointed United Nations Programme on HIV/AIDS (UNAIDS); World Health Organization (WHO)), health authorities of selected countries (Centers for Disease Prevention and Control, United States; European Centre for Disease Prevention and Control, European Union; Health Protection Agency, the United Kingdom; Health Canada, Canada; Department of Health and Ageing, Australia), published report on MSM (Treat Asia - MSM and HIV/AIDS Risk in Asia), and recent international conferences on AIDS (XVI International AIDS Conference, 13-18 August 2006; International Consultation on Male Sexual Health and HIV in Asia and the Pacific 22-26 September 2006).

3. For the literature review, various MeSH terms and key words have been used to identify the relevant articles. The key words used for searching included “Men who have sex with men.mp”, “MSM.mp”, “Homosexual men.mp”, “Gay.mp”, “HIV.mp”, “AIDS.mp”, Epidemiology/”, “Risk factors/”, “Trend.mp”, “Cause.mp” and “Rise.mp”.

Results

4. Results are tabulated in this review. The articles and reports referred are listed in the reference. Where appropriate and relevant, they are cited in the main text of the report, especially that of Chapter 2.

List of Boxes in Appendix A

Box 11	HIV situation among MSM in different regions of the world
Box 12	Prevalence of HIV among MSM in selected countries in Asia by year
Box 13	Recent trend (incidence, prevalence and proportion of MSM among all HIV cases) in selected countries
Box 14	Summary of research on the associations between MSM, HIV and sexual behaviour
Box 15	Summary of research on the associations between MSM, HIV and trends of sexual behaviour
Box 16	Summary of research on the associations between MSM, HIV and internet
Box 17	Summary of research on the associations between MSM, HIV, parties and party drugs
Box 18	Summary of research on the associations between MSM, HIV and commercial sex
Box 19	Summary of research on the associations between MSM, HIV and travel
Box 20	Summary of research on the associations between MSM, HIV and psycho-social factors including risk perception
Box 21	Summary of research on the associations between MSM, HIV and use of HARRT
Box 22	Summary of research on subgroups of MSM
Box 23	Schematic diagram summarizing the factors associated with HIV infection among MSM

Box 11. HIV situation among MSM in different regions of the world

REGION	SITUATION
Global	In 2005, it was estimated that 38.6 million people were living with HIV worldwide and there were about 4.1 million new infections. About 5-10% of these cases were transmitted between men.[5]
Europe	In western European countries, MSM accounted for 50% of all HIV infections in 2005. The HIV epidemic in central Europe was in its initial phase and in eastern European countries, less than 1% of all infections were MSM.[6]
North America	In the United States, MSM accounted for 44% of new HIV infections from 2001 through 2004.[7] In Canada, 51% of all individual living with HIV were attributed to sex between men in 2005.[8]
South America	The average prevalence of HIV among MSM in 9 South American countries was 12.3% (surveyed from 1995 through 2002), ranging from 2.8% in ports of Ecuador to 27.8% in Guayaquil of Ecuador. [9]
Southeast Asia and the Pacific	It was estimated there were 10 million MSM.[10] Prevalence of HIV among MSM in selected countries is shown in Table 4, which is lowest in Malaysia (0.76%) to 28.3% in Bangkok of Thailand.[11-24]
Africa	Not much data was available.

Box 12. Prevalence of HIV among MSM in selected countries in Asia by year

COUNTRY	YEAR	MSM HIV PREVALENCE
Thailand [11]	2005	28.3% (Bangkok)
Cambodia [12]	2000	14.4% (Phnom Penh)
Taiwan [13]	2004	8%
India [14-17]	2001-2006	Varies by region: 6.5% (Anhra Pradesh) 6.8% (Tamil Nadu) 6.8% (Mubai) 16.8% (Maharashtra) 4.4%-18% (Chennai)
Vietnam [18]	2005	6.0%-8.0%
Japan [19]	2002	4.4% (Tokyo), 1.3% (Osaka)
Mainland China [20-21]	2005 2001-2002	0.9% 3.1% (Beijing)
Indonesia [22]	2002	2.5% (Jakarta)
Hong Kong [23]	**2001**	**1.4%**
Philippines [24]	2003	<1.0%
Malaysia [25]	2004	0.76%

Box 13. Recent trend (incidence, prevalence and proportion of MSM among all HIV cases) in selected countries

Country (Area)	Reference	Prevalence of HIV positive MSM (Year)		Incidence of HIV positive MSM (Year)		% of MSM over all HIV cases (Year)	
USA	26-28	-	25% N=1767 (Jun 04-Apr05)	-	-	32.0% N=21,704 (2000)	38.3% N=35,537 (2005)
Canada	8, 29	-	-	0.79 /100 person-year (1996)	1.16 /100 person-year (2000)	42.6% N=2100-4000 (2002)	45.6% N=2300-4500 (2005)
UK	30	-	5.2% (2005)	-	-	39.3% N=3871 (2000)	31.6% N=7450 (2005)
Switzerland	31	-	-	-	-	24.8% N=597 (1999)	33.3% N=529 (Jan-Sep, 2005)
Rome, Italy	32	-	-	2.26 /100 person-year (1996-1999)	4.97 /100 person-year (2000-2003)	-	-
Denmark	33	-	-	-	-	39% N=4254 (1990-2004)	65% N=190 (2004)
Norway	34	-	-	-	-	-	57% (2004)
Netherlands (Amsterdam)	35	10.5% N=314 (1998)	14.9% N=348 (2001)	-	-	-	-
Spain	36	6% (2000)	6% (2003)	1.41 /100 person-year (2000)	3.28 /100 person-year (2003)	-	-
Australia	37	-	-	0.5% among 25 yrs older (2003)	1.5% among 25 yrs older (2005)	-	64% (2001-2005)
Peru	38	<1% (1996)	>5% (2002)	-	-	-	-
Thailand (Bangkok)	39	17.3%, N=1121 (2003)	28.3% N=399 (2005)	-	-	-	-

Risk Factors Associated with HIV among MSM (Boxes 14-22)

Box 14. Summary of research on the associations between MSM, HIV and sexual behaviour

Author, year (ref)	Type of study	Study population	Main findings
Travis et al., 2006 [40]	Cross-sectional survey	100,030 MSM in USA	75% reported having a **casual male sex partner** during the preceding 12 months. 47% reported having **unprotected anal intercourse**. Non-injection drug used by 42% by participants in the preceding 12 months.
Dandona, al., 2005 [41]	Cross-sectional survey	6661 MSM in India	In the last 3 sexual encounters, 55.9% did **not use condom** at least once. 32.1% reported **never use condom. Lack of knowledge** was the strongest associated factor for non-use of condom (OR:8.80; 95% C.I.:7.55-10.25)
Beryl et al., 2006 [42]	Cohort study	4295 MSM in 6 US cities	Risk factors of HIV infection included **four or more male sex partners**, **unprotected receptive anal intercourse** with any HIV serostatus partners and unprotected insertive anal intercourse with HIV-positive partners, amphetamine or heavy alcohol use and alcohol or drug use before sex. The attributable fractions of high number of male partners, use of alcohol or

			drugs before sex, and unprotected receptive anal intercourse with unknown status partners and the same with presumed negative partners accounted for 32.3, 29.0, 28.4 and 21.6% of infections, respectively.
Gutierrez, et al., 2006 [43]	Cross-sectional survey	2594 MSM in Ecuador	55% had **unprotected penetrative sex** with each of their last 3 partners and 25% had **never used a condom**. Most important correlates of condom use were single status, high life-skills rating and high socio-economic status.
Weber, et al., 2001 [44]	Cross-sectional survey and cohort study	1373 gay and bisexual men in Canada	Seropositive MSM were more likely to report **having consensual sex at a younger age**, having **at least 6 partners** during the previous year, engaged in **unprotected receptive anal intercourse**, involved in sex trade, and use of soft drugs and infection drugs. Similar results for the seroconverted MSM.
Bouhnik, et la., 2006 [45]	Cross-sectional survey	National representative sample of 1117 French gay men	607 (54.3%) declared having had **causal partners** during the previous 12 months, and 140 (20%) of the latter group had engaged in **unsafe sex**.
Pando et al., 2003 [46]	Cross-sectional survey	694 MSM recruited from voluntary counseling and testing service in Argentina	13.8% positive for HIV. Univariate analysis revealed older age (30-39), being unemployed, **previous STD, having a HIV positive partner**, cocaine consumption and **irregular use of condoms** with occasional partners as risk factors.

			Multivariate analysis showed being unemployed (OR:3.42; 95% C.I.:1.17-9.99) and having an HIV-positive partner (OR:2.67; 95% C.I.:1.09-6.52) remain significant.
Brewer et al., 2006 [47]	Random-digit dial telephone survey	311 MSM in Seattle, USA	14% reported HIV positive. Among HIV positive MSM, strongest correlates included **number of recent male sex partners** (OR:1.07) and per partner and recent use of amyl nitrite (OR:3.1)).
Colby, 2003 [48)	Cross-sectional survey	219 MSM in Ho Chi Minh City, Vietnam	Mean **number of sexual partners** was 3.3 in the previous month and 14.8 in the previous year. 32% used **condom** during last intercourse and 40% during last anal sex. 81% reported sex with **non-regular male partners**.
Volk, et al., 2006 [49]	Cross-sectional survey and cohort study	103 Australian MSM who were newly acquired HIV between 2003-04	73% reported **more than 5 partners** in the last 6 months. 70% reported **unprotected anal intercourse**, 22% reported use of injection of drug and 62% reported intoxication with alcohol or mood altering recreational drug use.

Box 15. Summary of research on the associations between MSM, HIV and trends of sexual behaviour

Author, year	Type of study	Study population	Key findings
Williamson, et al., 2006 [50]	Cross-sectional survey	8247 MSM from commercial gay scenes in London and Glasgow in 1996, 1999 and 2002	**Increased trends of unprotected anal intercourse** (UAI), with partners of unknown or discordant HIV status, UAI with partners with more than 1 partner in 1999 and 2002 in London and 2002 in Glasgow.
George, et al., 2006 [51]	Cohort study with time-trend analysis, from 1997 through 2003	579 MSM in Canada	There was an **increase in UAI with casual partners** (OR:1.05; 95%C.I.:1.01-1.09). UAI increased with regular seroconcordant partners (OR:1.06; 95%C.I.:1.04-1.09) and any type of partner (OR:1.05; 95%C.I.:1.03-1.07).
Folch, et al [52]	Cross-sectional survey	MSM recruited in gay venues and organization of Spain, 1995 through 2002	Prevalence of HIV increased form 14.2% in 1995 to 18.3% in 2002. **Increasing** of proportion of men who had **>10 sexual partners** in the pervious 12 months (from 45.2% in 1995 to 55.7% in 2002, $p<0.0001$).

Box 16. Summary of research on the associations between MSM, HIV and internet

Author, year (ref)	Type of study	Study population	Key findings
Liau et al., 2006 [53]	Meta-analysis	15 studies	In 15 studies recruiting MSM offline, 40% (95% C.I. 35.2%-45.2%) of MSM had used internet to look for sex partners. This percentage was higher among HIV positive participants (49.6%; 95% C.I. 44.9%-54.3%) than HIV negative MSM (41.2%; 95% C.I. 36.8%-45.6%). Results from 11 studies showed that UAI with male sex partners was more likely among MSM who **sought partners online** than MSM who did not (OR:1.68; 95% C.I.: 1.18-2.40) .
Elford, et al., 2004 [54]	Cross-sectional survey	1218 London MSM	MSM online were **younger** (mean age 34 vs 36 years), **less likely to have been tested for HIV** (68 vs 80%, p<0.001), reported **unprotected anal intercourse** with a partner of unknown or discordant HIV status (32% vs 22%).
Horvath, et al., 2006 [55]	Cross-sectional survey	804 MSM recruited online	MSM who found sex partners through internet were 3-fold more likely **not to use condom** all the time with casual partners (OR: 2.96, 95%C.I: 1.52-5.77) and 2-fold more likely having **5 or more partners** in the past 3 months (OR: 1.98, 95%C.I.:1.16-3.40).

McKirnan et al., 2006 [56]	Cross-sectional survey	817 MSM	Men who sought sex online reported more **unprotected sex and sexually transmitted infections**, controlling for demographics and overall number of sex partners.

Box 17. Summary of research on the associations between MSM, HIV, parties and party drugs

Author, year (ref)	**Type of study**	**Study population**	**Key findings**
Celentano, et al., 2006 [57]	Cross-sectional venue-based survey	3492 young MSM,	Reported receptive anal intercourse at least once 6 months prior to the survey was associated with use of **alcohol** (AOR:1.5; 95%C.I.:1.1-2.2), **amphetamines** (AOR:1.5; 95%C.I.:1.1.-2.0) and **marijuana** (AOR:1.3; 95%C.I.:1.1-1.6).
Sanchez and Gallagher, 2006 [58]	Cross-sectional survey	1177 MSM recruited at bar	11% of MSM reported recent Viagra use. Users were more likely to be infected with HIV (AOR:2.0, 95% C.I.:1.0 -3.9); having more male sex partners (AOR:2.4 to 2.7, 95% C.I.:1.2-5.4); more likely to have unprotected anal intercourse with a nonprimary male partner (AOR:2.1, 95% C.I.:1.2-3.5); and more likely to report illicit drug usage (AOR:3.1, 95% C.I.:1.9-5.2). 53% (70/131) of **Viagra** users simultaneously took illicit drugs.

Purcell, et al., 2005a [59]	Cross-sectional survey	1168 HIV positive gay an bisexual men in New York and San Francisco	47.4% used non-injection drugs before /during sex. In the 3 months before the survey 57.5% used non-injection drug: **marijuana** (42.2%), **poppers** (26.1%), **cocaine** (17.9%), **Viagra** (12.3%), **methamphetamine** (10.1%), **Ecstasy** (7.3%). Use of party drugs was associated with unprotected anal intercourse.
Purcell et al., 2005b [60)	Cross-sectional survey	1168 HIV positive gay an bisexual men in New York and San Francisco	Current use of **Viagra** was 12%. Use of Viagra was related to unprotected receptive and insertive anal intercourse with both HIV positive and HIV negative/unknown status casual partners.
Mattison, et al., 2001 [61]	Cross-sectional survey	1169 party attendees at 3 North American parties	In the preceding 12 months, prevalence of using **alcohol** was 79%, **Ecstasy**:72%, **Special K**: 60%, **marijuana**:45%, **cocaine**:39%, **crystal meth**:36%, **poppers**:39% and **GHB**:28%. Reasons for attending the party were to celebrate, have fun (97%), to dance, enjoy music (97%), to be with friends (95%), to escape from day-to-day routines (84%), to look and feel good (86%), to have an intense gay experience (73%0, to be wild and uninhibited (68%), to party, use drugs (58%0, to have sex (43%) and to forget about HIV/AIDS (14%).
Kim et al.,	Cross-sectional	844 male STD	31% gay or bisexual men used **Viagra**. Viagra use was more common among HIV

2002 [62)	survey	patients (352 were gay or bisexual)	positive gay or bisexual men than HIV negative men (39% vs 29%).
Chu, et al., 2003 [63]	Community based survey	837 MSM in San Francisco	32% had ever use **Viagra**. Significant predictors of Viagra use were white race, older age, HIV positivity, illicit drug use, having had unprotected anal sex with potentially serodiscordant partners. Over one-third combined Viagra with other drugs (18% with amyl nitrate).
Paul et al., 2005 [64]	Population based telephone survey	879 MSM in San Francisco	Recent **Viagra** use was reported by 29% of the respondents and was associated with HIV serostatus, greater numbers of male sexual partners, higher levels of unprotected anal sex, and higher levels of illicit recreational drug use.
Operarto, et al., 2006 [65]	Cross-sectional venue-based survey	496 young Asian Pacific Islander MSM	51% used club drugs in the past 6 months (**marijuana** 44%, **Ecstasy** 47%). Substance use was associated with risky sexual behaviours.
Darrow, et al., 2005 [66]	Cross-sectional survey	407 American MSM	32% reported using one or more **club drugs** in the past year. Club drug was highly associated with unprotected anal intercourse (P<0.001).
Colfax et al., 2001 [67]	Cross-sectional survey	295 gay or bisexual men from San	80% of participants used **Ecstasy**, 66% **ketamine**, 43% **crystal methamphetamines**, 29% **gamma-hydroxybutyrate** or **gamma-butyrolactone**, 14% **Viagra**, and 13%

		Francisco	**poppers**; 53% used 4 or more drugs. Predictors of unprotected anal sex with opposite or unknown HIV status partners included being HIV positive, use of **crystal meth** (OR:2.4; 95%C.I.:1.1-4.9), **Viagra** (OR:3.8; 95%C.I.:2.0-7.3), and **poppers** (OR:2.2; 95%C.I.:1.3-4.0).
Fernandez et al., 2005 [68]	Cross-sectional survey	176 Hispanic MSM recruited online	48.5% used club drugs (**cocaine, crystal methamphetamines, amyl nitrites, Ecstasy, GHB, ketamine or Viagra**) in the past 6 months.
Parsons, et al., 2004 [69]	Qualitative study	Ethnically diverse gay and bisexual men from New York City	**Alcohol** use facilitates engagement in sexual practices that perceived as stigmatic while sober.

Box 18. Summary of research on the associations between MSM, HIV and commercial sex

Author, year (ref)	**Type of study**	**Study population**	**Key findings**
Aynalem, et al., 2006 [70]	Cross-sectional survey	1351 MSM diagnosed with syphilis in USA	Those who had sexual encounter were more likely to have **anonymous sex** (OR: 6.18, 95%C.I: 3.37-11.32), **not use condom** (OR: 2.02, 95%C.I: 1.71-2.38), use **non-IV drugs**, (OR: 1.65, 95%C.I: 1.21-2.37) have **HIV** (OR: 1.91, 95%C.I: 1.36-2.68).

Weber et al., 2001 [71)	Cross-sectional survey	761 young gay and bisexual men in Canada	16% reported involvement in commercial sex which was defined as having sex in exchange for money, drugs, goods, clothing, shelter or protection within one year prior to enrollment. Sex trade workers had **significantly higher HIV prevalence** than non-sex trade workers (7.3% vs 1.1%, $p<0.001$).
Bacon et al., 2006 [72]	Cross-sectional survey	227 street recruited MSM injection drug users in USA	68% reported being paid by another man for sex. HIV prevalence was 12%. Consistent usage rate of condom was 41%.

Box 19. Summary of research on the associations between MSM, HIV and travel

Author, year (ref)	**Type of study**	**Study population**	**Key findings**
Benotsh et al., 2006 [73]	Cross-sectional survey	247 MSM tourists recruited in gay venue in Florida	22% reported anal sex with **multiple partners** over a brief period (mean-4.1 days). About one-third reported having sex with a partner met during the vacation period.

Box 20. Summary of research studying association between MSM, HIV and psycho-social factors including risk perception

Author, year (ref)	**Type of study**	**Study population**	**Key findings**
Mackellar et al., 2006 [74]	Cross-sectional survey	3137 young MSM in 6 cities of US	25.7% perceived themselves at moderate / high lifetime risk for acquiring HIV. Among 267 unrecognized infection, half **perceived** themselves at **low** lifetime **risk**. They were more likely to report unprotected anal intercourse with male partners of unknown HIV status.
Da Siva, et al., 2005 [75]	Cross-sectional survey	161 Brazil MSM	The **optimistic perception** score created for this study was associated with unprotected sex (p=0.001). The quartile with the most optimistic perception was 1.8 times more likely to engage in unprotected sex compared with the quartile with the least optimistic perception.
Wong et al., 2006 [76]	Qualitative study semi-structured in-depth interview	24 Chinese MSM	**Social stigma** and one child policy had strong influenced the "coming out" of MSM in China High risk behaviour such as multiple sexual partners, commercial sex, and drugs and alcohol consumption have significant roles in the MSM relationship **Low perceived susceptibility** and **inadequate/inappropriate health seeking**

			behaviour contribute to more infection.
Vicioso et al., 2005 [77]	Surveys and qualitative interviews	64 MSM in New York and San Francisco	**Escape from distressing thoughts and feelings** was one of the nonsexual reasons to have sex. The amplified sexuality and other unique characteristics of sex environments allow MSM to have more intense emotional experiences around sex.
Kesteren et al., 2005 [78]	Qualitative study semi-structured interview	30 MSM in Netherlands	Sexual problems in HIV positive MSM might be caused by **perceived risk of transmitting HIV to others**. Safer sexual behaviour seems to be related to feelings of personal responsibility for safer sex..

Box 21. Summary of research on the associations between MSM, HIV and use of HARRT

Author, year	**Type of study**	**Study population**	**Key findings**
Vanable et al., 2000 [79]	Cross-sectional survey	557 gay and bisexual men in Chicago	A substantial minority reported reduced HIV concern related to treatment services (e.g. 12% felt the new AIDS treatment (HAART) make them **less anxious about having unsafe sex**). The reduced HIV concern was an independent predictor of unprotected anal sex, unprotected anal sex with HIV positive partner and number of sexual partners.

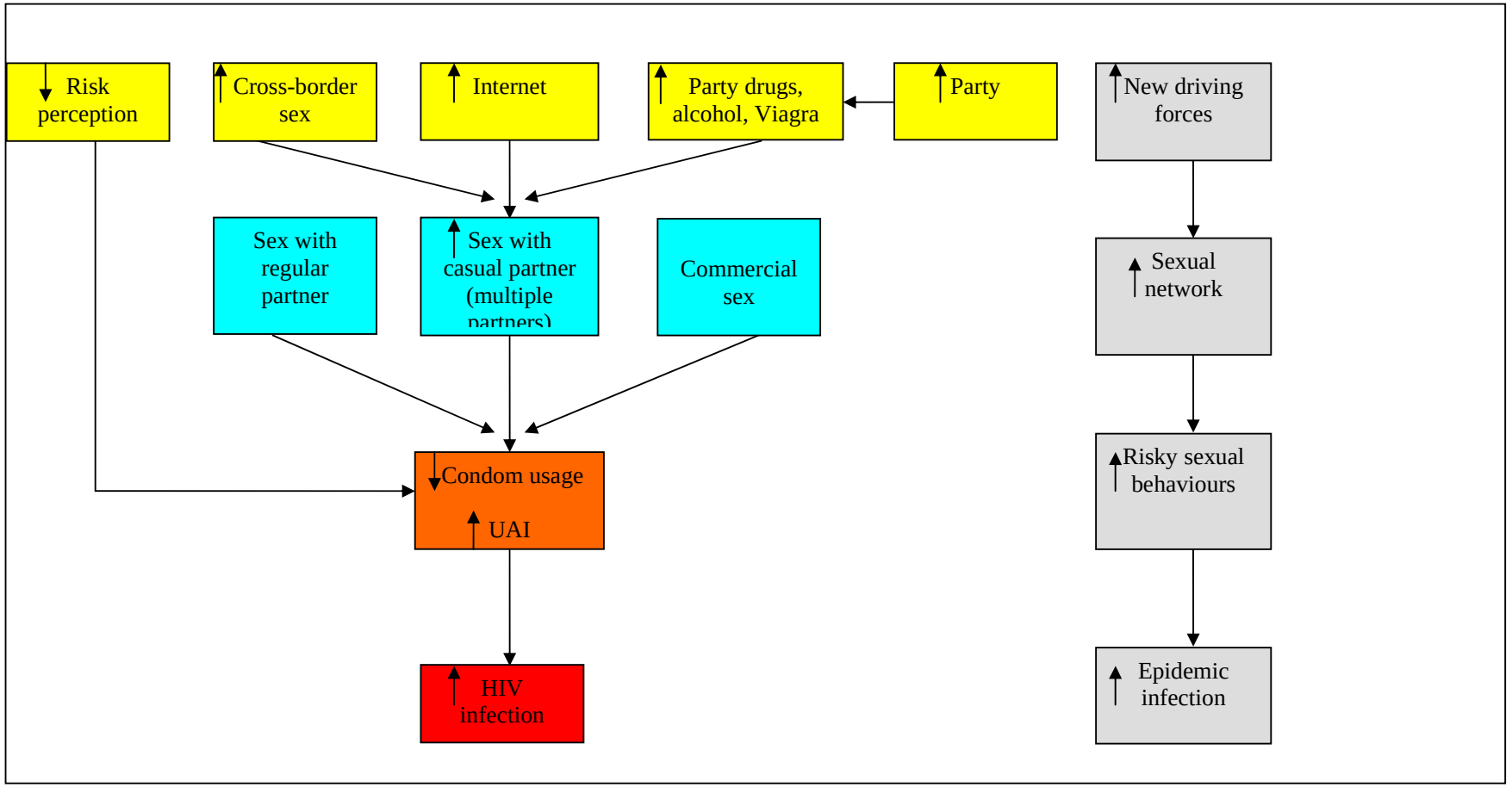
Mitchell, et al., 2002 [80]	Ecological study	MSM in San Francisco	From 1995 to 1999, use of HAART among MSM living with AIDS increased from 4% to 54%. However, MSM who reported both unprotected anal intercourse and multiple partners increased from 24% in 1994 to 45% in 1999. Annual HIV incidence rate increased from 2.1% in 1996 to 4.2% in 1999.
Stephenson, et al., 2003 [81]	Cross-sectional survey	420 HIV positive MSM attending London outpatient clinic	MSM on HAART had **fewer sexual partners** (median 9vs 20, p=0.28), **less unprotected anal intercourse** (27% vs 36% had insertive unprotected anal intercourse with a new partner in the past year, p=0.003), **fewer acute STD** (19% vs 33%, p=0.004 in the past 12 months) than men not on HAART.

Box 22. Summary of research on subgroups of MSM

Author, year (ref)	**Type of study**	**Study population**	**Key findings**
O'Connell, et al., 2004 [82]	Cross-sectional survey	910 MSM in Canada	12% injected drugs in previous year. Compared with other MSM, **MSM/IDU** were younger, more likely to be HIV-seropositive, economically disadvantaged, engaged in sex trade, have casual sex partners and female sexual partners, and unprotected receptive anal intercourse with casual partners.

Hightow et al., 2006 [83]	Record review	1105 new young MSM in New Carolina	Compared with MSM, **men who have sex with men and women** (MSM/W) were more likely to report >10 sex partners in the past year or have sex partners who were also MSM/W. Sexual network analysis revealed MSM/W occupied a central position in the sexual partner network.
Heckman, et al., 1999 [84]	Cross-sectional survey	79 African American and 174 white MSM	**African-American MSM** were more likely to be HIV positive, to report STD, have a recent unprotected sex partner known or believed to be HIV positive. Controlling for age, education and income, African-American MSM were less open about sexual orientation, poor knowledge related to HIV, more female sexual partners, more used cocaine with sex.

Box 23. Schematic diagram summarizing the factors associated with HIV infection among MSM



Appendix B Statistical Report on HIV in MSM in Hong Kong

Aim

1. The aim of this review is to summarise the situation of HIV infection among MSM in Hong Kong, focusing on the recent change in epidemiology.

Methods

2. Relevant statistics (prevalence, epidemiological and behavioural characteristics of the HIV positive MSM) were obtained from Special Preventive Programme (SPP) of Department of Health (DH), published literature, reports from a Non-government Organisation (AIDS Concern) through SPP and a consultancy report of Dr Tim Brown for DH. The population size of MSM in Hong Kong was estimated based on the population statistics of the Census and Statistical Department.

Results

3. Results are tabulated and presented in boxes 24 to 36.

List of Boxes in Appendix B

Box 30	Ethnicity distribution of HIV positive MSM new cases 1984-2005
Box 31	Suspected sources of HIV infection from MSM attending KBITC 2000-2004
Box 32	Suspected places of HIV infection from MSM attending KBITC 2000-2004
Box 33	Behavioural pattern of MSM attending voluntary testing service of AIDS Concern
Box 34	Condom use among adults MSM attending government AIDS counselling and testing service
Box 35	New infections in specific risk populations from the local epidemic in Hong Kong produced with the Asian Epidemic Model
Box 36	Annual care cost and accumulated additional care costs associated with failure to expand prevention efforts

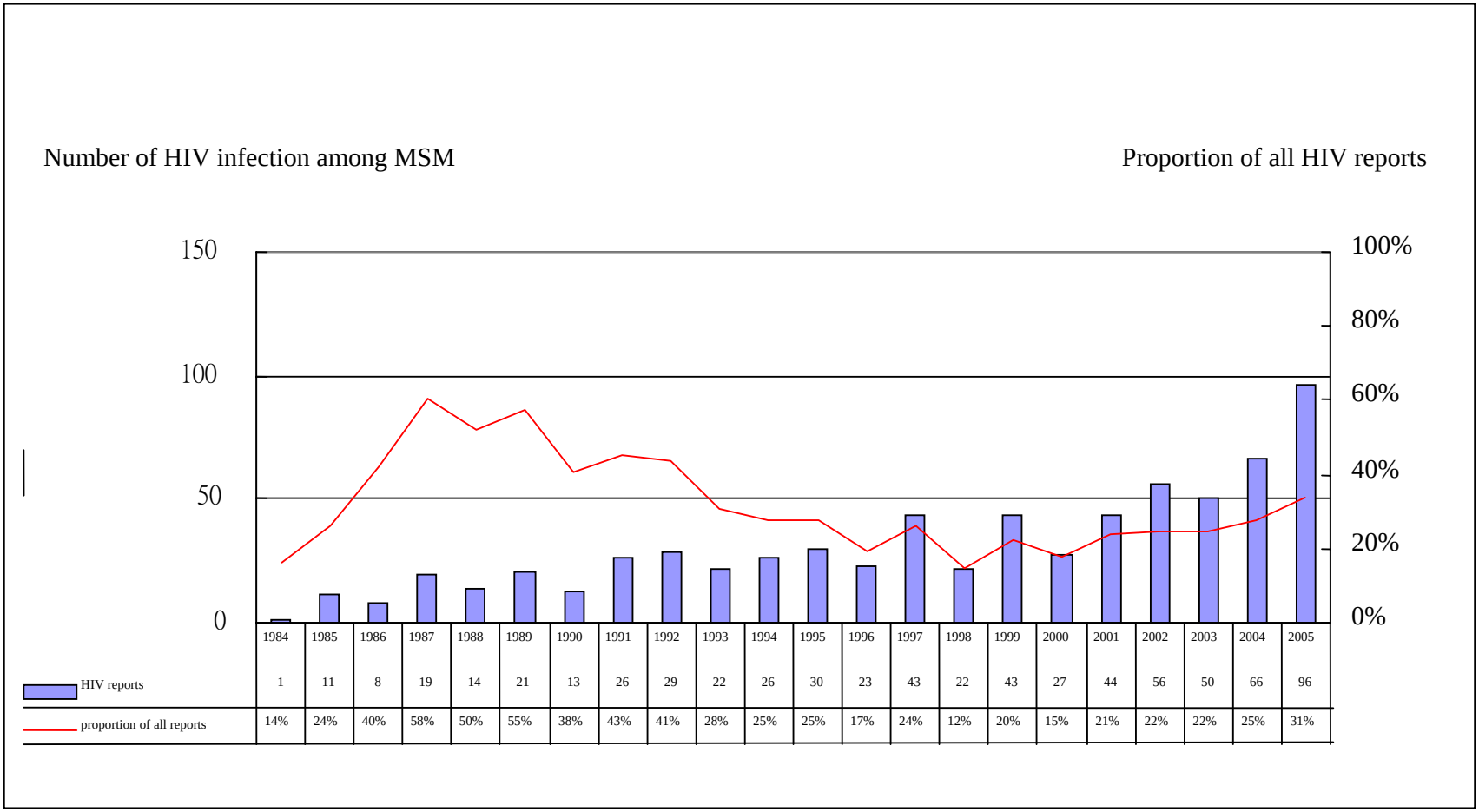
Box 24. Estimated population of MSM in Hong Kong

	Study sample by Lau (N=14 985)	End-2006 Hong Kong population
Ever engaged in MSM activity	667 (4.6%)	100 166
Had any sexual activity in the past 6 months	292 (2.0%)	43 546
Had anal sex in the past 6 months	72 (0.5%)	10 887

Box 25. Prevalence of HIV from voluntary testing conducted by AIDS Concern
(Clients were recruited from sauna. Since 2004, additional clients were recruited from internet)

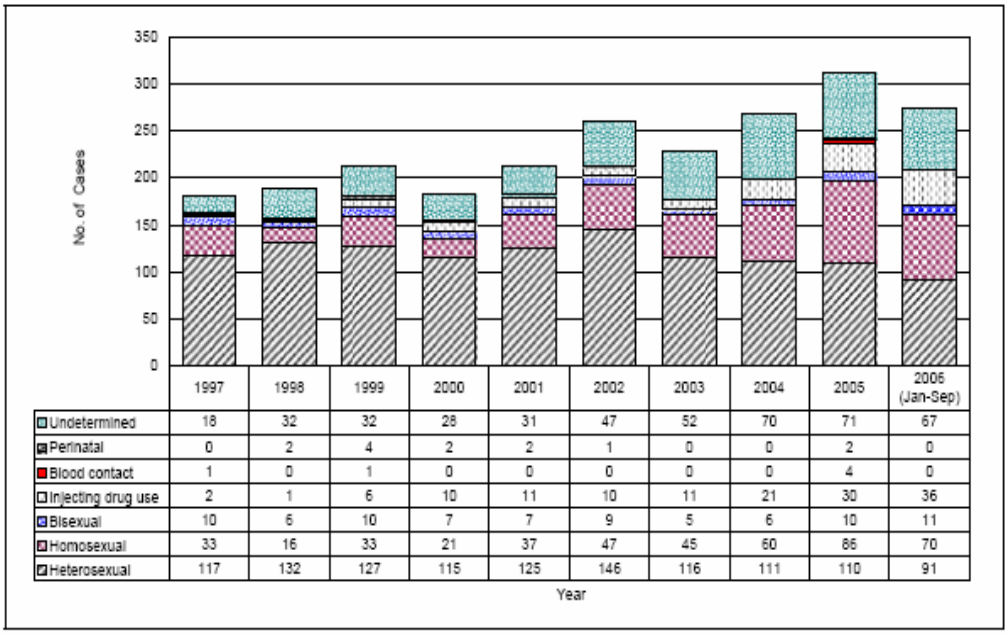
Year	**Number of tests**	**Positive test**	**% Positive**	**95% C.I.**
2000	38	0	0.00	(0.00 - 0.00)
2001	107	1	0.94	(0.024 - 5.21)
2002	130	1	0.77	(0.019 - 4.29)
2003	223	2	0.90	(0.11 - 3.24)
2004	332	6	1.81	(0.66 - 3.93)
2005	483	11	2.28	(1.14 - 4.08)

Box 26. Number of HIV reports with risk 'MSM' and its proportion among all reports [Source: SPP]



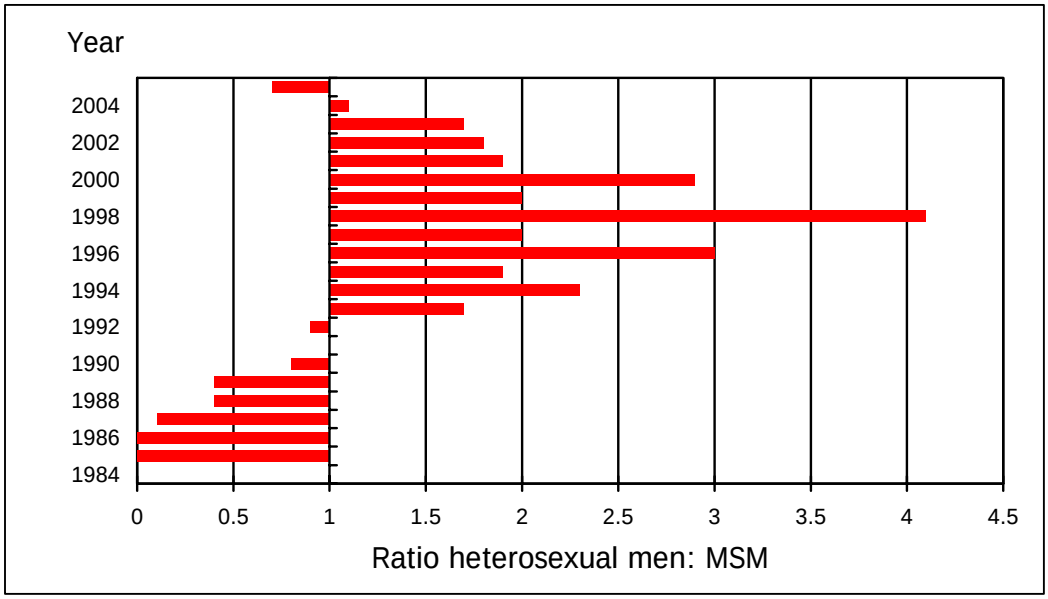
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
HIV reports	1	11	8	19	14	21	13	26	29	22	26	30	23	43	22	43	27	44	56	50	66	96
proportion of all reports	14%	24%	40%	58%	50%	55%	38%	43%	41%	28%	25%	25%	17%	24%	12%	20%	15%	21%	22%	22%	25%	31%

Box 27. Exposure categories of reported HIV [Source: SPP]

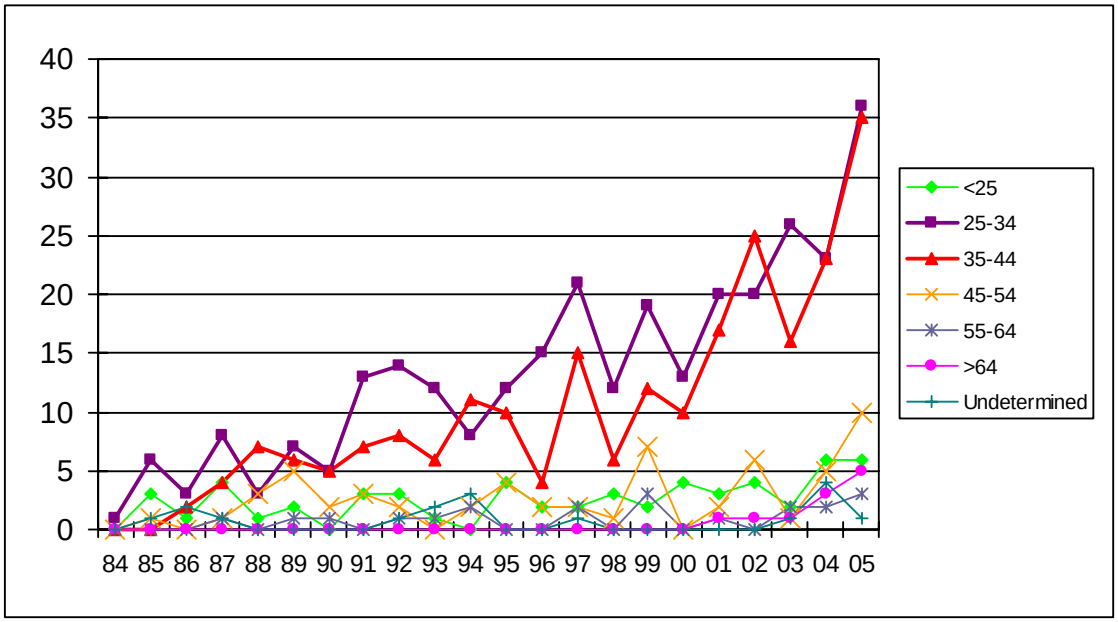


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006 (Jan-Sep)
Undetermined	18	32	32	28	31	47	52	70	71	67
Perinatal	0	2	4	2	2	1	0	0	2	0
Blood contact	1	0	1	0	0	0	0	0	4	0
Injecting drug use	2	1	6	10	11	10	11	21	30	36
Bisexual	10	6	10	7	7	9	5	6	10	11
Homosexual	33	16	33	21	37	47	45	60	86	70
Heterosexual	117	132	127	115	125	146	116	111	110	91

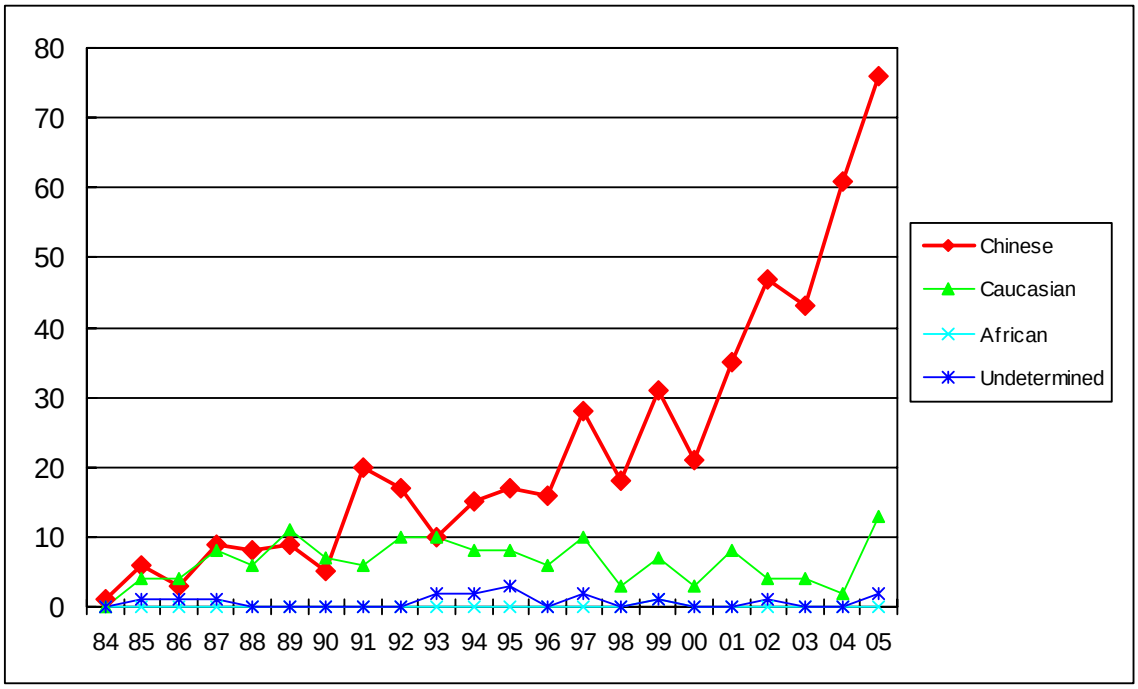
Box 28. Ratio of newly HIV reported case in heterosexual men to MSM (by year) 1984-2005 [Source: SPP]



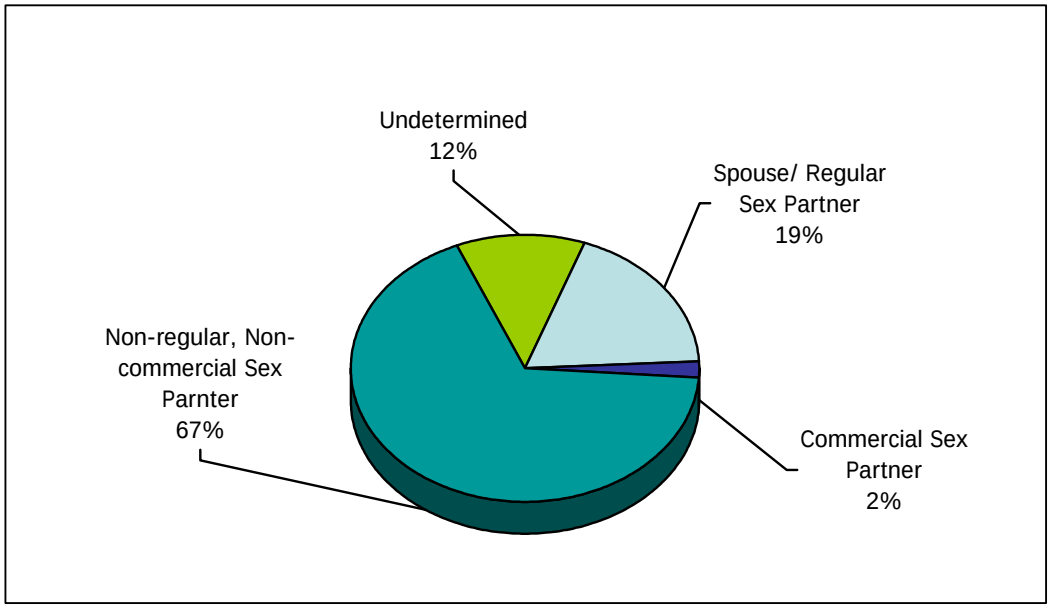
Box 29. Age distribution of MSM new cases 1984-2005 [Source: SPP]



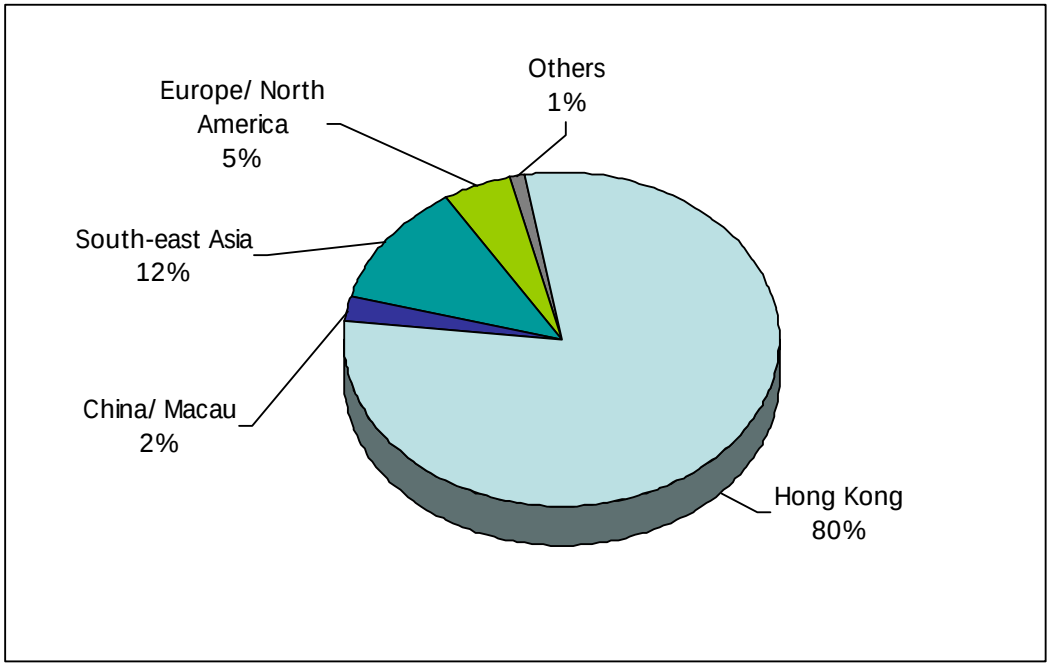
Box 30. Ethnicity distribution of MSM new cases 1984-2005 [Source: SPP]



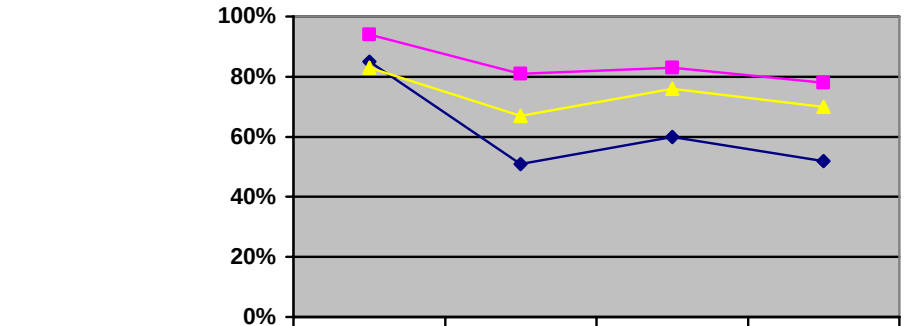
Box 31. Suspected source of HIV infection from MSM attending KBITC 2000-2004 [Source: SPP]



Box 32. Suspected place of HIV infection from MSM attending KBITC 2000-2004 [Source: SPP]

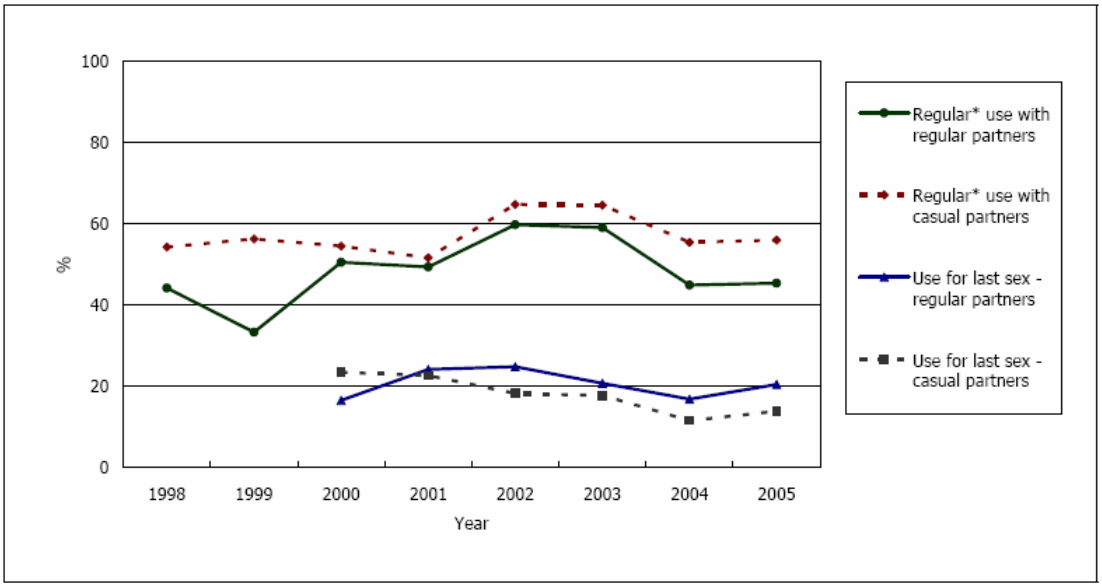


Box 33. Behavioural pattern of MSM attending voluntary testing service of AIDS Concern



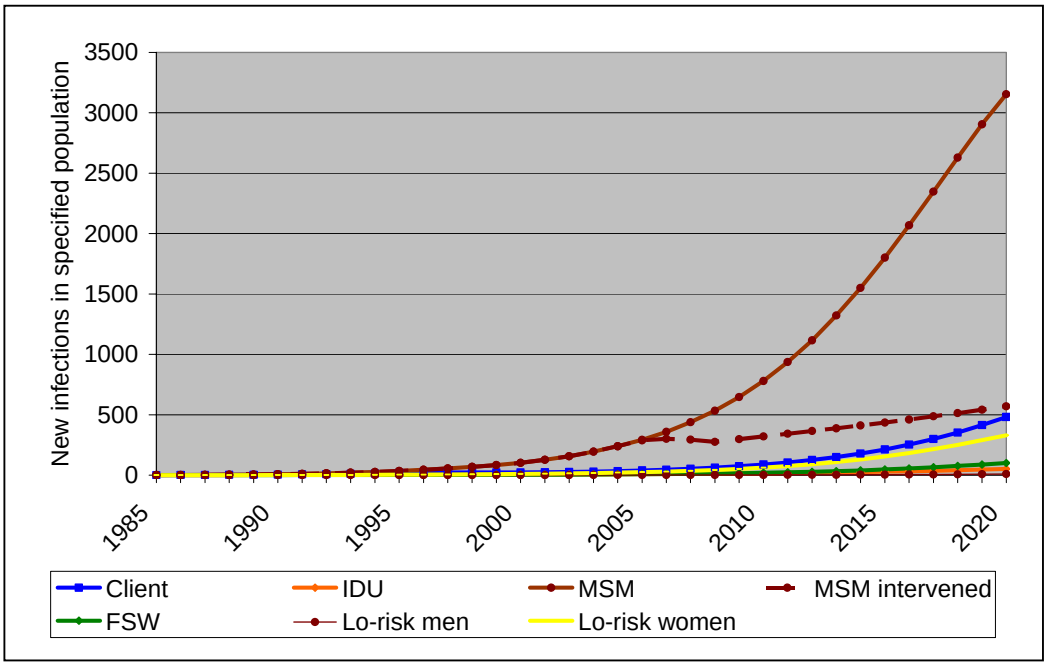
	2002	2003	2004	2005
use condoms in every anal sex in last 3 months	85%	51%	60%	52%
>50% condom use in anal sex in last 3 months	94%	81%	83%	78%
condom us in last sex	83%	67%	76%	70%

Box 34. Condom use among adults MSMs attending government AIDS counselling and testing service [source: SPP]

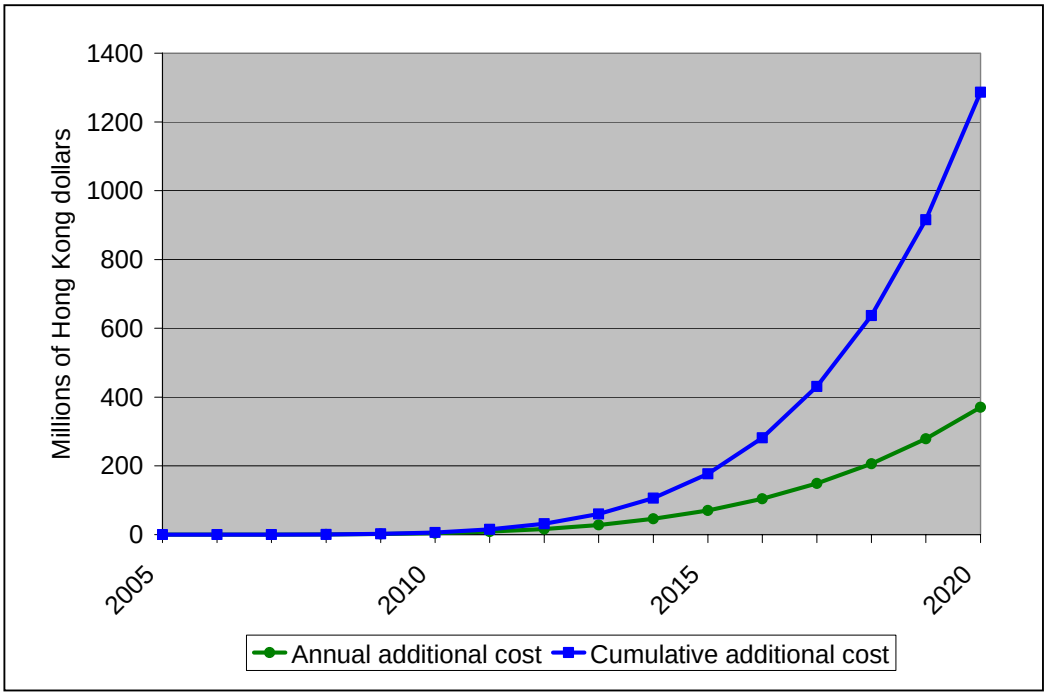


* Regular condom use is defined as always or usually using a condom on a 4-level scale
** Regular sex partners refer to the spouse or other long-term sex partners for at least one year, or if less than one year, one with whom you expect to continue sexual relationship. This include spouse, mistress, and steady boy/girl friends.
*** Casual sex partners, the two do not have steady relationship.

Box 35. New infections in specific risk populations from the local epidemic in Hong Kong produced with the Asian Epidemic Model [Source: HIV/AIDS in Hong Kong 2006 Living on the Edge]



Box 36. Annual care cost and accumulated additional care costs associated with failure to expand prevention efforts [Source: HIV/AIDS in Hong Kong 2006 Living on the Edge]



Appendix C Qualitative Study Report

Aim

1. A qualitative study was conducted to explore the psychosocial dimension of the MSM community and its association with HIV vulnerability. This was an exploratory study. The results from the interviews were used to construct the questionnaire for the survey (Appendix D).

Methods

2. We recruited HIV-positive MSM from the Integrated Treatment Centre (ITC). Convenience sampling was introduced to involve patients who were willing to participate in the study. Eligibility for participation was restricted to men who (a) admitted to have sex with men; (b) contracted HIV through homosexual activities; (c) were aged 18 or above; and (d) were Chinese who could communicate in Cantonese fluently.

3. The recruitment procedures were facilitated by ITC staff. Nurses identified eligible patients and made appointments with them 2 to 3 days before their regular follow-up sessions. The study was introduced over a telephone conversation, and an interview session followed at time convenient if the patient agreed to participate. At the beginning of each interview, the interviewer explained the study details, including the purpose, procedures, maintenance of confidentiality, and their rights to withdraw. Written consent was obtained from patients agreeing to participate. The interviews were recorded with patients' consents, and were transcribed for data analysis. No personal identifiers were recorded.

4. Interviews were conducted with the grounded theory approach. A simple checklist with six themes was used, which included (a) circumstances surrounding and leading to HIV infection; (b) setting of HIV diagnosis; (c) attitude and knowledge;

(d) access to support; (e) response to HIV status; and (f) role of homosexuality in the society. Concepts and categories were developed throughout the data collection period, and the interviewing questions were redesigned when new themes emerged. This process continued until information was saturated. All interviews were first transcribed in Cantonese, and then translated into English for data analysis. The transcribed data were grouped into broad categories based on our research questions and themes emerged during the interviews.

Results

5. The interviews were conducted in September 2006. Seven patients were invited and consented to participate. One interview was interrupted the result of which was discarded from data analysis. The length of the interviews ranged from 30 to 80 minutes. Several themes emerged and they were presented in the following boxes.

6. Results are tabulated in this appendix. The following is a list of the boxes in this appendix:

List of Boxes in Appendix C

Box 37. Setting of infection

Subject **Year of Diagnosis**	**02 (Age: 31)** **1995**	**01 (Age: 30)** **2005**	**03 (Age: 30)** **2005**	**05 (Age: 46)** **2005**	**06 (Age: 35)** **2005**	**04 (Age:31)** **2006**
Source of infection	It is impossible to know where I contracted HIV, because there were too many sex partners.	My infection should have come from my regular partner.	I am unable to guess where I got the virus, because there were too many partners at the same time.	It is impossible to know where I contracted HIV, unless I only had one partner since day 1.	My partner and I were not HIV positive. We are unable to know where the virus has come from, nor who has brought the virus in.	I was "bare back" most of the time. It was unsafe over the years. I could never know where I contracted HIV.
Location and reason for HIV testing	Red Cross; Pre-donation screening	Private clinic; Regular HIV testing	Hospital; Felt unwell because of complication	Private clinic; Felt unwell because of complication	Private clinic; Deterioration of physical health	NGO; Deterioration of physical health

Response to infection	I was not afraid - I didn't not know why. Since I am a member of the (MSM) circle, I would be infected eventually. It's just a matter of time when this is going to take place.	I did not feel surprised at all. Contracting HIV was "expected" once I decided I am a homosexual.	I did not feel surprised about the infection, but rather the setting of being tested HIV positive. I had expected a positive result from a social hygiene clinic instead, as this was where I did my regular tests. I am very clear about my lifestyle. Contracting HIV is something that will eventually happen.	I was a little afraid when I knew of my infection. My friends and family gave me substantial support, and they told me that I was the same as a person who does not have HIV. I felt comfortable with the infection very soon.	I was relatively calm when I acknowledged my HIV status. It was because some of my friends are HIV positive, and I am clear about the way of life after contracting HIV. Being homosexual, I expected I would contract HIV.	I did not feel surprised when I knew I have HIV. I was practicing unsafe sex, and I expected I would contract HIV.

Box 38. Sexual practices

Subject **Year of Diagnosis**	**02 (Age: 31)** **1995**	**01 (Age: 30)** **2005**	**03 (Age: 30)** **2005**	**05 (Age: 46)** **2005**	**06 (Age: 35)** **2005**	**04 (Age:31)** **2006**
Sourcing sex partners	There are a lot of channels to source partners. Sauna, bar, public toilet… even when you are walking on the street, you can identify potential partners as long as you are a member of the MSM circle.	Internet is the major channel that I use to identify sex partners. When I came back to Hong Kong from overseas, I did not have any friends or partners. Internet became a very good source for me to access the MSM network.	10 years ago, I would have gone to bar most of the time. I started to use internet and have gone to sauna afterwards, and these are my major channels to identify partners.	I went to public toilet in the past. Now, sauna becomes the place that I visit most.	I went to public toilet when I first engaged in the MSM network. Starting from 1999, I have mainly used internet to identify partners.	I went to public toilet when I was young. Now, sauna and internet are the most popular spots to source sex partners.

Internet	I did not use internet. I could not see the real person and it was not necessary to use internet to identify sex partners.	Internet is a good channel to identify sex partners. No face-to-face interaction is needed, and it is easy to be reached. Especially for those who do not know any member of the circle.	I guess 99% of gay men in HK have at least tried to use internet once. A majority of them use it to identify sex partners. You can almost see every one in the internet. It allows you to search partners at home…. it saves time and money.	I know nothing about computer and internet. I cannot give you any comment here.	You can identify and meet you partner through internet quickly. Hong Kong is a very small place, and it takes less than 2 hours for 2 men to meet. So, it is easy and quick enough to have sex through the use of internet.	Internet is very common, and it provides an easy access for us to identify sex partners. The trend has changed. Sauna is everywhere, you can have sex there,…it's safe, and it's really easy.
Party / Soft Drugs	People feel great after taking soft drugs. It is easy to access, and more people are using it compared to the	More people are using drugs, and it is hard for them to judge if their partners have used condom. Also they	There are lots of sex parties, threesome, foursome, much more than before.	I do not go to disco and bar. I do not drink and smoke. I have no idea and no interest to know what's going on in	--	There are a lot of "orgy parties" now, 3-play, 4-play, group sex…

	past.	are now engaging in group sex which is totally “bare back”.		parties and the use of soft drugs within the circle.		
Types of partners	Usually, I go for one-night stand when I first encounter a potential partner. Even if I have developed a long-term relationship with another guy, both of us would still have sex with other men.	All partners are casual in the first place. It takes about 2 to 3 months to decide if I intend to develop a long-term relationship with this guy. If yes, that will be a potential long-term partner.	There are several stages. When I first meet a potential partner, I would still look for other opportunities as long as no commitment has been made. After recognizing that we are couples, I would stop searching and only have sex with him. But it is hard to maintain the relationship.	I am one of those who look for long-term partners, and I am longing for a one-to-one relationship. It is really hard to achieve. I felt really bad when I saw my partner hug another gay after having sex with me. But this is the norm of this circle. I tried to get use to this “phenomenon”, but	To me, I do not have casual partner when I have a regular partner. It is not easy to handle both regular and casual partner at the same time! After so many years, I am not interested in having so many sexual activities. Long-term relationship would be my preference.	I am longing for a long-term relationship. But it’s hard to find one in our circle, unless you can accept “open relationship”.

			Problems arise in about 3 months, and then we would break up.	I am still looking for a stable relationship.		
Condom use - Oral sex	--	Unless there are condoms in better taste, otherwise, it's hard to use condom during oral sex.	--	--	It is rare to use condom in oral sex within the MSM circle.	I cannot stand the taste of the condom. I prefer not to do it if I have to use condom.
Condom use - Anal sex	I do not prefer the use of condom, it gives a different feeling. Trust is another important aspect. But, for those who are not interested to use condom, even you	I would force all my casual partners to use condom, but am less stringent to my long-term partner. To prevent HIV, it is one's own responsibility; do not leave it on	I had sex with a number of men, both inside and outside Hong Kong. I have not paid much attention to my own safety. When I have fun during sex, I do not	I use condom most of the time; there were some situations that I did not use it. I think most people would use condom, the main reason being to protect	My situation is quite special. My partner would encounter erectile problem when he tried to put on the condom. If we want to have anal sex, we would not use condom. For	I do not like condom. It sounds like I do not trust my partner. Having sex is a connection between 2 persons… the use of condom changes the whole thing.

	give him the condom during the process, he will not use it.	other's shoulder. I contracted HIV, but I have no one to blame. I should have protected myself in the very first place. And my partner may not even know he 's positive when we had sex!	care if we should use condom. Even if my partner has told me he's HIV positive, I might just do the same.	themselves instead of protecting others. However, when the "feeling" comes, it's hard to be rational. Or I should say the use of condom did not come up to our mind.	most of us, when the "feeling" comes, it's hard to have a clear mind and pick out a condom. The "feeling" is different when a condom is used. When we become regular partner, we look for intimate relationship, and it is more likely that condom will not be used among regular partners.	

Box 39. Identity formation

Subject **Year of Diagnosis**	**02 (Age: 31)** **1995**	**01 (Age: 30)** **2005**	**03 (Age: 30)** **2005**	**05 (Age: 46)** **2005**	**06 (Age: 35)** **2005**	**04 (Age:31)** **2006**
Acknowledging same sex orientation	I recognized my sexual orientation when I was 16 to 17 years old.	It took me quite a long time to recognize I am gay. Not until I turned 19 that I became certain sure of my homosexual identity	I discovered my interest in men when I was 12. I was sexually aroused by good-looking male classmates. I did not have such feelings from any female.	I knew I am gay when I was very young, about 8 to 10 years old. I was attracted by handsome guys, and I would look at my male classmates.	I would not say I knew I am gay when I was in primary 1, but I sensed that I was different from my classmates.	I knew I am gay when I was studying secondary school. I was sexually aroused by my male classmates.
Reaction to homosexuality	I did not struggle about my sexual orientation. There's no reason to do so.	Well, the struggle took place before I acknowledged I am gay. I have interest in male when I was	It's a natural process. I never think that being gay is a problem. I do not have the feeling	I did not struggle at all. This is very natural. I think I am very lucky, that I have my family and	I had consultation with counselor. I wanted to know why this happened in me, and what I	I had struggled when I knew I am gay. I questioned myself if I have a chance to change to

		young. I tried to find a girlfriend, then I found out I had no interest in women	of guilt or shame, and I do not think that I have done anything wrong. I was born this way, and it is not a disease.	my friends supporting me over the years. I got a lot of positive response from them when they know that I am gay.	could do in the future. My religious background gave me more burdens, the struggling was very stressful.	heterosexual. I tried to date my female classmates when I was an undergrad. After that, I was very sure becoming heterosexual is impossible.

Appendix D Survey Statistical Report

Aim

1. A questionnaire survey was conducted to identify possible reasons for the recent rising trend in HIV infection among MSM.

Methods

2. The questionnaire survey was administered through both Integrated Treatment Center (ITC) and Queen Elizabeth Hospital Special Medical Service (QEHSMS). Patients who (a) contracted HIV via homosexual transmission; (b) were aged 18 or above; and (c) consented to participate were recruited in the study.

3. Nurses in ITC notified the patients about the survey, and patients in QEH were directly approached by the research assistant. Patients who were interested were invited to the interviewing room to complete the questionnaire. A research assistant was stationed at each clinic session. She explained the study in detail, confirmed the eligibility of the patients, obtained written consent from the patients, and made clarification as necessary.

4. The questionnaire covered the following areas: (a) setting of infection; (b) sexual behaviours in three-year period before infection; (c) homosexual identity formation; and (d) sexual behaviour in 2006.

Results

5. The study was conducted over an eight-week period in November 2006 and February 2007. One hundred and ninety-eight patients were recruited, accounting for 90.0% of the totally number of MSM approached. Non-Chinese forms completed

were not included in the analysis. Five other questionnaires were discarded due to inconsistent response, leaving a total of 180 successfully completed questionnaires available for analysis.

6. Statistical results of the survey are tabulated in the boxes in this appendix. These are discussed in Chapter 4 of the main report.

7. The following is a list of boxes in this appendix.

List of Boxes in Appendix D

Box 40. Demographics

		Mean (SD)	Median (Range)
Age		40.12 (9.87)	39.00 (21-74)
Years of Infection		7.68 (5.28)	7.00 (1-25)
Years of Diagnosis		5.22 (4.36)	4.00 (1-20)
		Response	**Percentage (%)**
Education	Primary	16	8.9%
	Secondary	97	53.9%
	Tertiary or above	67	37.2%
Employment Status	Employed*	141	79.7%
	Unemployed	36	20.3%
Living Status	Alone	62	34.4%
	With Family	78	43.4%
	With Male Partner	36	20.0%
	With Friends	4	2.2%

** Includes full time employment, part time employment and students*

[#] No difference was found in demographics between ITC and QEH patients

Box 41. Location first tested HIV positive and reasons for testing

	Response	Percentage
Location first tested HIV positive		
Private doctors / Laboratories	40	22.2%
Hospital	63	35.0%
Social Hygiene Clinic	20	11.1%
QEH, Special Medical Services	6	3.3%
Integrated Treatment Center	4	2.2%
YMT Jockey Club 5/F Room 9	22	12.2%
NGOs	8	4.4%
Red Cross	12	6.7%
Overseas	4	2.2%
Reasons for HIV testing		
Perceived chance of infection	36	20.0%

Peer influence	12	6.7%
Regular HIV testing / Health Screening	20	11.1%
Infected with STIs	23	12.8%
Felt unwell because of complications	90	50.0%
Blood Donation	11	6.1%

Box 42. MSM population characteristics

	2000 or Before	2001 or After	Statistical Analysis	p-value
Current Age**	44 (28 – 74)	36 (21 – 71)	Mann Whitney U 2523.00	<0.01
Age of Infection **	30.48 (8.72)	34.24 (9.84)	t = -2.655	<0.01
Age of Diagnosis	34.15 (8.95)	35.19 (9.94)	t = -0.727	>0.05
Lag Phase** *(Yr of Dx. – Yr of Inf.)*	2 (0 – 18)	1 (0 – 3)	Mann Whitney U 2523.00	<0.01

Differences in education, employment status, and living status did not reach statistical significance.

Box 43. Attitudes towards diagnosis

	2000 or Before	2001 or After	Odds (95% C.I.)
Attitudes towards diagnosis			
Felt disturbed	71 (78.9%)	62 (74.7%)	0.79 (0.39, 1.60)
Knowledgeable in HIV	44 (48.9%)	47 (56.6%)	1.37 (0.75, 2.49)
Source of infection			
Able to guess the source of infection	36 (40.0%)	38 (45.8%)	1.27 (0.69, 2.32)
Source of infection = Regular partner	22 (24.4%)	26 (32.1%)	1.46 (0.75, 2.86)
Source of infection = Casual partner	56 (62.2%)	58 (71.6%)	1.53 (0.80, 2.92)
Infected in Hong Kong*	61 (67.8%)	66 (81.5%)	2.09 (1.02, 4.27)

**p<0.05, Chi-square = 4.189*

Box 44. Location identified the source of infection

	Response	Percentage
Public Toilet	22	13.3%
Bar	40	24.1%
Sauna	79	47.6%
Internet	43	25.9%
Parties	16	9.6%
Beach	9	5.4%
Gym	11	6.6%
Others	15	9.0%

Box 45. Sourcing sex partners (3-year period before infection)

	2000 or Before	2001 or After	Odds (95% C.I.)
Public Toilet*	24 (26.7%)	11 (13.3%)	0.42 (0.19, 0.92)
Bar	34 (37.8%)	24 (28.9%)	0.67 (0.35, 1.27)
Sauna	33 (37.1%)	34 (41.0%)	1.18 (0.64, 2.18)
Internet**	7 (7.8%)	37 (44.6%)	9.54 (3.94, 23.10)
Party	10 (11.1%)	12 (14.5%)	1.35 (0.55, 3.32)
Beach*	17 (18.9%)	6 (7.2%)	0.34 (0.13, 0.90)
Gym	14 (15.6%)	14 (16.9%)	1.10 (0.49, 2.47)

**p<0.05*

Public Toilet: Chi-square = 4.81

Beach: Chi-square = 5.09

***p<0.01, Chi-square = 30.83*

Box 46. Location for sex (3-year period before infection)

	2000 or Before	2001 or After	Odds (95% C.I.)
Public Toilet	15 (16.7%)	7 (8.4%)	0.46 (0.18, 1.19)
Bar	9 (10.0%)	4 (4.8%)	0.46 (0.14, 1.54)
Sauna	34 (37.8%)	38 (45.8%)	1.39 (0.76, 2.55)
Hotel	17 (18.9%)	20 (24.1%)	1.36 (0.66, 2.83)
Party	4 (4.4%)	7 (8.4%)	1.98 (0.56, 7.03)
Beach	6 (6.7%)	2 (2.4%)	0.35 (0.07, 1.76)
Gym	5 (5.6%)	1 (1.2%)	0.21 (0.02, 1.81)
Home*	25 (27.8%)	40 (48.2%)	2.42 (1.29, 4.55)
Partner's Home	37 (41.1%)	46 (55.4%)	1.78 (0.97, 3.26)

**p<0.05, Chi-square = 7.67*

Box 47. Sexual practice (3-year period before infection)

	2000 or Before	2001 or After	Odds (95% C.I.)
Having sex Outside HK	47 (52.2%)	38 (45.8%)	0.77 (0.43, 1.41)
Masturbation	77 (85.6%)	69 (83.1%)	0.83 (0.37, 1.89)
Oral Sex	70 (77.8%)	68 (81.9%)	1.30 (0.61, 2.74)
Anal Sex	43 (47.8%)	50 (60.2%)	0.83 (0.37, 1.89)
Use of Condom			
- Oral	18 (20.2%)	10 (12.3%)	0.56 (0.24, 1.29)
- Anal	57 (64.0%)	59 (73.8%)	1.58 (0.82, 3.05)
Ever used Soft Drugs*	9 (10.1%)	21 (26.3%)	3.16 (1.35, 7.40)
Ever had commercial sex	15 (16.7%)	10 (12.2%)	0.69 (0.29, 1.65)
Any Regular Partner	42 (46.7%)	45 (54.2%)	1.35 (0.74, 2.46)

**p<0.05, Chi-square = 7.52*

Box 48. Steady and casual relationships (3-year period before infection)

	2000 or Before	2001 or After	Odds (95% C.I.)
Concurrency			
2+ regular partners	19 (45.2%)	18 (40.0%)	0.92 (0.29, 2.89)
Regular + Casual partners	32 (76.2%)	42 (93.3%)	0.99 (0.42, 2.35)
Partner's Concurrency			
2+ regular partners	23 (54.8%)	22 (50.0%)	1.33 (0.52, 4.23)
Regular + Casual partners	31 (73.8%)	39 (88.6%)	0.94 (0.37, 2.41)
Use of Condom			
Regular Partner / Oral Sex	6 (15.4%)	4 (9.3%)	0.56 (0.15, 2.17)
Regular Partner / Anal Sex	25 (71.4%)	21 (51.2%)	0.42 (0.16, 1.09)
Casual Partner / Oral Sex	21 (24.7%)	10 (12.5%)	0.44 (0.19, 0.99)
Casual Partner / Anal Sex	58 (73.4%)	63 (80.8%)	1.52 (0.72, 3.23)

[#] *1 vs 2-6*

Box 49. Assortative mixing

	Response	Percentage (%)
Age		
10+ years younger	37	20.67%
2 – 9 years younger	76	42.22%
Similar age	113	62.78%
2 – 9 years older	96	53.63%
10+ years older	44	24.44%
Ethnicity		
Westerners	43	24.02%
South East Asian	47	26.40%
Mainland Chinese	25	14.04%
Hong Kong Chinese	146	81.56%

Box 50. Identity formation

	Mean (SD)	Median (Range)
Age	17.28 (6.71)	16.00 (3-45)
Age of First Sex	21.02 (6.80)	20.00 (6-55)
Age of First Anal Sex	23.15 (6.71)	22.00 (10-55)
Age of First MSM Network Contact	22.88 (7.36)	21.00 (6-60)

*(*3 patients did not engage in the MSM network)*

		Response	Percentage
First Sex	Masturbation	146	82.0%
	Oral	94	52.8%
	Anal	41	23.0%
Role of First Sex	0	103	59.9%
	1	54	31.4%
	10	15	8.7%
Attitude towards Identity formation			
Struggled during realization of sexual orientation		72	40.0%
Sure about my sexual orientation when I first had sex		133	74.3%
Sure about my sexual orientation when I first had anal sex		138	78.9%
Lost sexual interest in the opposite sex		135	75.0%

Box 51. Association between internet use and sexual behaviour

	Internet			
	Non-Users	**Users**	**Chi-Square**	**Odds (95% C.I.)**
Anal Sex*	47 (47.5%)	52 (64.2%)	5.03	1.98 (1.09, 3.62)
Oral Sex*	74 (74.7%)	71 (87.7%)	4.74	2.40 (1.08, 5.35)
Anal Sex – Condom Use**	56 (58.9%)	63 (77.8%)	7.08	2.44 (1.26, 4.74)
Oral Sex – Condom Use	21 (21.9%)	9 (11.1%)	3.62	0.45 (0.19, 1.04)
Sex at Home**	21 (21.2%)	46 (56.8%)	24.13	4.88 (2.54, 9.37)
Sex at Partner's Home**	34 (34.3%)	51 (63.0%)	14.64	3.25 (1.76, 6.00)

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

Appendix E Administrative Summary

Box 52. Calendar of project

<table>
<tr><th></th><th>Desktop Review</th><th>Qualitative Study</th><th>Quantitative Study</th></tr>
<tr><td>Sept, 2006</td><td rowspan="3">Identify local and overseas literature and reports</td><td>Data collection, transcription</td><td rowspan="2">Questionnaire development</td></tr>
<tr><td>Oct</td><td>Translation, data analysis</td></tr>
<tr><td>Nov</td><td rowspan="3"></td><td rowspan="3">Data collection</td></tr>
<tr><td>Dec</td><td rowspan="2">Critical appraisal</td></tr>
<tr><td>Jan, 2007</td></tr>
<tr><td>Feb</td><td rowspan="2">Report writing</td><td rowspan="2">Report writing</td><td>Data analysis</td></tr>
<tr><td>Mar</td><td>Report writing</td></tr>
</table>

Box 53. List of key informants and date of interview

Category	Interviewee	Date of interview
Business sector	Sauna owner	5.10.06
	Bar owner	25.9.06
	Gay-oriented magazine editor	10.10.06
	Gay website owner	3.10.06
	Travel Agent	4.10.06
Community leader	Leader of Chi Hang Foundation	3.10.06
Non-government organization	Worker in AIDS Concern	5.10.06
	Leader of a gay group	12.10.06
Active member in MSM	Active member in MSM	6.10.06

~ End of Report ~