

## SEXUAL BEHAVIOUR

# HIV related behaviours and attitudes among Chinese men who have sex with men in Hong Kong: a population based study

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**Objective:** This study was conducted in order to determine the prevalence of men having sex with men (MSM) and their HIV related behaviours and attitudes among Chinese men in Hong Kong.

**Methods:** A large scale, random, population based, anonymous telephone survey of 14 963 men between the ages of 18–60 was conducted. The overall response rate was approximately 57%.

**Results:** Of the respondents, 4.6% had ever engaged in MSM activity. In the 6 months preceding the survey, 2.0% had engaged in MSM behaviours (active MSM) and 0.5% reported having engaged in anal sex MSM behaviours. Among anal sex MSM, consistent condom use was 42.9% with male non-commercial sex partners and even lower with male commercial sex partners (35.7%). Approximately 11% of anal sex MSM and 4.1% of the non-anal sex MSM had contracted an STD in the last 6 months. The prevalence of HIV testing was only 20.6% among anal sex MSM and 11.9% among non-anal sex MSM.

**Conclusions:** Active MSM in Hong Kong are at high risk of HIV infection. The belief of low vulnerability to HIV is prevalent among active MSM in Hong Kong with only 2.0% believing that their chances of HIV infection as being "very likely."

Men who have sex with men (MSM) have been extensively studied in industrialised countries,<sup>1–6</sup> where MSM remains the most common mode of HIV transmission.<sup>1</sup> In the West, the HIV prevalence among MSM is much higher than among heterosexuals (ranging from 7.2% in younger MSM to 18.1% in inner city cohorts).<sup>2–5 7</sup> Studies in Asian-American MSM have reported HIV seroprevalence estimates ranging from 1.4% to 27.8%.<sup>8</sup> Although a recent study in Japan noted that the HIV prevalence was 3.8/1000,<sup>6</sup> it is largely unknown how applicable findings from the Western hemisphere are to Chinese populations. In Hong Kong, the reported seroprevalence of HIV in the general population was 0.06%.<sup>9</sup> As of December 2001, approximately 24% of the 1755 reported HIV cases in Hong Kong were attributed to homosexual/bisexual men.<sup>10</sup> The low levels of HIV testing among Hong Kong MSM (15.5%)<sup>11</sup> compared to western MSM populations (63–85%)<sup>12–14</sup> makes the estimation of HIV seroprevalence in this population difficult. Moreover, there are few data about risk behaviours of MSM in Hong Kong.<sup>15 16</sup> A preliminary study of MSM revealed that 4.1% of the adult male population in Hong Kong had ever practised any MSM behaviour; moreover, these MSM were less likely to perceive themselves to be at high risk for HIV and were more likely to practise unsafe behaviours compared to the clients of female sex workers.<sup>16</sup>

### Objectives

The aims of the study are: (1) to investigate the distribution of different types of MSM behaviours in Hong Kong; (2) to assess HIV related knowledge and to describe the demographic and attitudinal characteristics of the Hong Kong MSM population; (3) to describe patterns of sexual behaviours as well the prevalence and factors related to risk behaviours among Hong Kong MSM.

### METHODS

#### Sampling and data collection

A telephone survey was carried out from July 2001 to October 2001 on a target population comprising all Chinese Hong Kong males between the ages of 18 and 60. Telephone numbers were sampled randomly from up to date residential phone directories. Almost 100% of the Hong Kong residents have fixed telephones at home.<sup>17</sup> Telephone surveys have been commonly used in local surveys and some researcher have suggested that telephone surveys are more appropriate than other survey methods in collecting sensitive data,<sup>18</sup> and computer assisted methods have also been used to improve validity of risk behaviour studies.<sup>19</sup> The interviews were conducted by trained research staff between 6 pm to 10.30 pm in order to avoid over-representation of non-working individuals. Unanswered telephone calls were given at least two attempts per night for a 2 week period before being classified as invalid.

A male member, aged 18–60 years, whose past birthday was closest to the day of the interview was requested to participate in the study (77% of the households with at least one male member had only one male member, 17.9% had two, and only 5% had more than two).<sup>20</sup> Eligible respondents were then briefed about the study and were asked for verbal consent to join the study.

The interviewer then asked a few non-sensitive questions to establish rapport (part I). After assuring them that their phone numbers would not be recorded, the respondents were requested to key in their responses to the second part of the questionnaire after listening to the prerecorded questions in a widely known phone polling system (the "dot-line" service). The interviewer left the line after connection was made. The "dot-line" telephone number was not released to the respondents. This computer call-in method has been shown to result in a higher reported frequency of risk behaviours

**Abbreviations:** MSM, men who have sex with men

when compared to the conventional telephone interview method.<sup>21</sup>

Out of all valid household contacts ( $n = 26\ 163$ ), 58.2% of them had one male member complete the non-sensitive part I; over 95% of these respondents went on to complete the part II questionnaire. The overall response rate, defined as the number of interviews divided by the total number of valid household contacts ( $14\ 985/26\ 163$ ), was approximately 57%.

Based upon the responses to the question: "Have you ever had sex with a man (anal, oral or masturbation)?" the 14 985 respondents were classified as non-MSM or ever MSM. The ever MSM, depending upon whether or not they reported having had sexual contact (anal, oral, masturbation) with another man in the past 6 months, were classified as an active MSM or non-active MSM. The active MSM group was further divided into non-anal sex MSM and anal sex MSM based upon whether or not the active MSM reported anal sex with a man in the past 6 months (see fig 1).

### Measurements

Demographic information and HIV related knowledge and perceptions were collected in part I of the study (table 1). Respondents were asked to self report whether they had contracted any sexually transmitted disease (STD) in the last 6 months. In part II, only active MSM respondents went on to complete the rest of the questionnaire. They were asked about HIV related behaviours (see table 2) and attitudes related to condom use (see table 3).

### Statistical analysis

$\chi^2$  Tests and univariate logistic regression models were first conducted to test for statistical significance. Stepwise multiple logistic regression models were run using univariately significant variables. Results are presented with odds ratios (OR) and 95% confidence intervals (CI). All analyses were conducted using SPSS for Windows version 11.

## RESULTS

### Comparisons among MSM subgroups

The distribution of the different MSM subgroups is shown in table 1. Active MSM respondents were likely to be younger than their non-active MSM counterparts ( $p = 0.006$ ). Among active MSM, anal sex MSM were much more likely than non-anal sex MSM to be single ( $p < 0.001$ ) and more highly educated ( $\chi^2$   $p$  value = 0.01). Among active MSM, anal sex MSM consistently demonstrated better HIV related knowledge than their non-anal sex counterparts (OR = 1.7–2.4) but were also much less likely to believe that MSM behaviours are associated with a higher risk of HIV infection (OR = 0.22).

### Patterns of HIV related behaviours among active MSM

Anal sex MSM, compared to non-anal sex MSM, were much more likely to have three or more MSM partners in the preceding 6 months (OR = 4.68 to 5.17), believe that their MSM partners have other MSM sex partners (OR = 1.98),

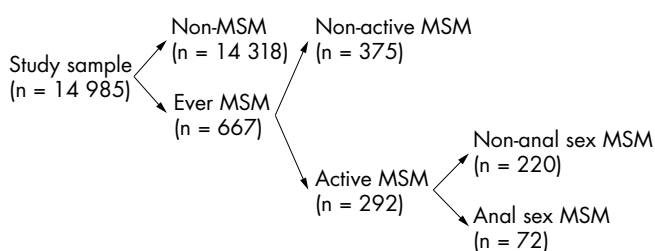


Figure 1 Schematic diagram of the study sample.

and to have engaged in oral sex (82.6%) and unprotected oral sex (52.4%) in the last 6 months (OR = 3.16 to 6.35, table 2).

Of anal sex MSM, 11% (95% CI 3.1 to 19.1) had self reported having contracted an STD in the last 6 months, compared to 4.1% (95% CI 1.5 to 6.8) of those in the non-anal sex MSM subgroup (table 2). Only 13.9% (95% CI = 9.8 to 17.9) of active MSM had undergone an HIV antibody test in the last 6 months, with the anal sex MSM subgroup (20.6%) more likely to have been tested than non-anal sex MSM (11.9%) (OR = 1.92). Only about 7% and 3.5% of non-anal sex MSM and anal sex MSM, respectively, had joined an AIDS prevention activity in the last 6 months ( $p > 0.05$ ).

### Perceptions of HIV risk and intentions for future HIV preventative behaviours among active MSM

A much lower proportion of anal sex MSM (34.5%) believed that they had "no chance" of contracting HIV in the future, compared to non-anal sex MSM (60.2%). Moreover, only about 5% of anal sex MSM and 1% of non-anal sex MSM felt that contracting HIV in the future was "most likely" (table 2).

A high proportion (54.8%) of active MSM stated that there is "no possibility at all" of always using condoms with their MSM partners in their sexual activities in the coming 6 months (40.4% for the anal sex MSM subgroup versus 59.2% for the non-anal sex MSM subgroup,  $p < 0.05$ ) (table 2). Of the active MSM, 26.3% of the anal sex subgroup stated that they would "mostly likely not" use condoms more frequently in the future because of fear of contracting HIV while 36.5% of the non-anal sex subgroup responded similarly ( $p < 0.05$ , table 2). Among active MSM, fear of contracting an STD (42.6%) rather than HIV (25.8%) was the most commonly cited primary motivation for using condoms with their MSM partners followed by fear of infecting sexual partners with STD/HIV (8.6%) ( $p < 0.05$ , table 2).

### Perceptions related to condom use among active MSM

Approximately 20% of the active MSM respondents disagreed with the necessity for using condoms when having sex with another man; about one in eight disagreed with that the statement "the use of condoms could reduce the chance of contracting HIV via MSM behaviours"; about one in six active MSM disagreed that "there is a high chance for HIV infection via unprotected MSM behaviour," and 18.1% agreed with the statement "you had a total control in deciding whether condoms are to be used with their MSM partners" (table 2).

The anal sex MSM was more likely than the non-anal sex MSM to perceive not having total control over condom use, to perceive a high chance of contracting HIV via unprotected oral sex, and to perceive that most of their peers would use condoms (OR = 2.08 to 2.94, table 2).

### Multivariable analysis to distinguish between anal sex MSM and non-anal sex MSM

Using all variables that were univariately significant (tables 1 and 2), a stepwise multivariable model was run to distinguish between the two subgroups of active MSM. anal sex MSM were more likely than the non-anal sex MSM to have had three or more MSM partners in the past 6 months (OR = 5.4, 95% CI 2.5 to 11.7,  $p < 0.001$ ), more likely to have greater than form 5 education (OR = 2.1, 95% CI 1.03 to 4.4,  $p = 0.04$ ) and less likely to have had sex with a woman in the past 6 months (OR = 0.1, 95% CI 0.04 to 0.21,  $p < 0.001$ ).

### Condom use and additional risk behaviours among the anal sex MSM subgroup

Supplementary questions were asked to the anal sex MSM respondents (data are not tabulated). Of the anal sex MSM, 19.4% (14/72) had had at least one commercial MSM partner

**Table 1** Comparison of background characteristics by MSM category

	Active non-anal sex MSM (n = 220)	Active anal sex MSM (n = 72)	All active MSM (n = 292)	Non active MSM (n = 375)	Univariate OR (95% CI)	$\chi^2$ p value
<b>Demographics</b>						
Age group						
18–25 years	36.4	41.7	37.7	32.8	1.00	0.20
26–35 years	27.7	34.7	29.3	20.5	1.09 (0.58 to 2.05)	
36–45 years	18.2	15.3	17.5	24.0	0.73 (0.33 to 1.61)	
46–60 years	17.7	8.3	15.5	22.4	0.41 (0.16 to 1.07)	
Missing	0.0	0.0	0.0	0.3		
Education level						
Primary or below	13.2	5.6	11.3	11.2	1.00	0.45
F.1–4	24.5	16.7	22.6	22.3	0.85 (0.52 to 1.40)	
F.5–7	40.9	38.9	40.4	43.3	1.31 (–0.68 to 2.54)	
University or above	21.4	38.9	25.7	23.1	1.20 (0.69 to 2.09)	
Missing	0.0	0.0	0.0	0.1		
Marital status						
Currently single	52.7	73.6	58.1	53.8	1.00	0.11
Currently married	46.4	20.8	39.9	44.4	0.73 (0.53 to 0.99)	
Divorce/separation/widow	0.9	5.6	2.0	1.6	1.32 (0.40 to 4.42)	
Cohabitation/other	0.0	0.0	0.0	0.0		
Missing	0.0	0.0	0.0	0.1		
<b>Know someone living with HIV/AIDS</b>						
No	81.4	75.0	79.8	NA*		NA
Yes	5.0	5.6	5.1	NA		
Missing	13.6	19.4	15.1	NA		
<b>General HIV related knowledge</b>						
One can look healthy long after getting HIV						
Incorrect (No)	58.2	47.2	55.2	53.9	1.00	0.73
Correct (Yes)	41.8	52.8	44.8	46.1	0.95 (0.70 to 1.29)	
Kissing on the mouth can transmit HIV						
Incorrect (Yes)	28.6	25.0	28.3	42.4	1.00	<0.001
Correct (No)	71.4	75.0	71.7	57.6	1.87 (1.35 to 2.59)	
HIV is detectable 1 week after infection						
Incorrect (Yes)	43.2	26.4	38.7	44.0	1.00	0.17
Correct (No)	56.8	73.6	61.3	56.0	1.24 (0.91 to 1.70)	
Perceived HIV infection risk via MSM behaviours is						
Very low/low	45.0	73.6	52.5	43.5	1.00	0.02
Very high/high	55.0	26.4	47.5	56.5	0.70 (0.51 to 0.94)	

\*Questions were not asked if the respondents had not had MSM behaviours in the last 6 months.

**Table 2** Patterns of HIV related behaviours and perceptions among active MSM

	Engaged in MSM behaviours excluding anal sex in the last 6 months (non-anal sex MSM) (n=220)	Engaged in MSM anal sex in the last 6 months (anal sex MSM) (n=72)	Engaged in any MSM behaviours in the last 6 months (All active MSM) (n=292)	Univariate OR† (95% CI)
	%	%	%	
<b>Behaviours in the last 6 months</b>				
Number of MSM partners				
1-2	82.3	48.6	74.0	1.00
3-5	8.2	25.0	12.3	5.17 (2.45 to 10.91) ***
6 or above	9.5	26.4	13.7	4.68 (2.28 to 9.60) ***
Do you think that your MSM partner has other sex partners?				
No	69.4	53.4	65.7	1.00
Yes	30.6	46.6	34.3	1.98 (1.09 to 3.60) *
Ever in the last 6 months engaged in oral sex without using condoms				
No oral sex at all in last 6 months	49.5	17.5	42.3	1.00
No, had not engaged in oral sex without using condoms	27.1	30.2	27.8	3.16 (1.41 to 7.09) **
Yes, had engaged in oral sex without using condoms	23.4	52.4	29.9	6.35 (2.97 to 13.57) ***
Contracted an STD				
No	95.9	88.9	94.3	1.00
Yes	4.1	11.1	5.7	2.90 (1.04 to 8.14) *
Tested for HIV antibody				
No	88.1	79.4	86.1	1.00
Yes	11.9	20.6	13.9	1.92 (0.92 to 4.00)
Joined AIDS prevention activity				
No	93.0	96.5	93.8	1.00
Yes	7.0	3.5	6.2	0.48 (0.11,2.21)
<b>HIV related perceptions</b>				
Perceived chance of contracting HIV in the future				
No chance	60.2	34.5	54.2	1.00
Likely	38.7	60.3	43.8	2.72 (1.46,5.06)**
Most likely	1.0	5.2	2.0	8.62 (1.35,54.89)*
In the next 6 months, what is the chance of using condoms every time when having sex with same sex partners				
No possibility at all	59.2	40.4	54.8	1.00
Likely	27.7	24.6	27.0	1.30 (0.62,2.71)
Most likely	13.0	35.1	18.3	3.95 (1.88,8.31)***
In the next 6 months, would you use condoms more frequently because of the fear of contracting HIV				
Mostly likely not	36.5	26.3	34.0	1.00
May be	32.6	29.8	31.9	1.27 (0.58,2.76)
Mostly likely yes	30.9	43.9	34.0	1.96 (0.94,4.09)
Most influential factor for motivating you to use condoms with MSM partners				
The fear of contracting STD	41.4	46.6	42.6	1.00
The fear of contracting HIV	24.7	29.3	25.8	1.05 (0.52,2.14)
The fear of infecting your sexual partners with STD/HIV	8.6	8.6	8.6	0.89 (0.30,2.67)
Other	25.3	15.5	23.0	0.55 (0.24,1.26)
<b>Perceptions related to condom use‡</b>				
% Disagreeing: "The use of condoms is necessary when having sex with same sex partners"	14.1	22.0	15.8	1.72 (0.83,3.57)
% Disagreeing: "Condom use would reduce the chance of HIV infection while having anal sex with same sex partners"	13.8	8.5	12.6	0.58 (0.21,1.56)
% Disagreeing: "The chance of contracting HIV is very high when having anal sex without using condoms"	14.0	24.1	16.3	1.96 (0.95,4.00)
% Disagreeing: "You have a total control in deciding whether to use condoms when having sex with same sex partners"	14.9	28.8	18.1	2.32 (1.16,4.54)*
% Disagreeing: "The chance of contracting HIV is very high when having oral sex without using condoms"	37.7	63.8	43.6	2.94 (1.59,5.26)***
% Disagreeing: "Among the peers you know, most of them would use condoms during sexual intercourse"	29.0	45.9	32.8	2.08 (1.15,3.73)*
All	100.0	100.0	100.0	

†OR, odds ratio for having anal sex versus not having anal sex in the last 6 months.

‡Items asked only to active MSM.

\*p&lt;0.05, \*\*p&lt;0.01, \*\*\*p&lt;0.001.

in the last 6 months (8.3% had three or more such partners). Among the 14 respondents who had visited a male sex worker in the last 6 months, only five (35.7%) had always used condom. About 23% of the anal sex MSM subgroup had three or more non-commercial MSM partners in the last 6 months; and among those who had had sex with any non-

commercial partners, only 42.9% always used condom (18.4% most of the time, 14.3% sometimes, and 24.5% never).

Only 44.1% of the anal sex MSM subgroup had used condoms during their last episode of anal sex and the reasons cited for non-use were (data not tabulated) the belief that their partner was disease free (31.6%), fear of affecting the

**Table 3** Univariate associations between various factors and practising unprotected oral sex and HIV antibody testing among active MSM

		% practised unprotected oral sex in last 6 months*	p value†	% tested for HIV antibodies in the last 6 months	p value†
<b>Age group (years)</b>			0.31		0.34
18–25		43.8		16.8	
26–35		58.2		9.5	
36–45		50.0		10.6	
46–60		63.2		18.6	
<b>Educational level</b>			0.22		0.78
Primary or below		53.8		9.4	
F 1–5		43.9		15.4	
F 6–7		60.0		15.6	
University or above		61.7		12.2	
		51.9			
<b>Marital status</b>			0.09		0.60
Currently single				14.5	
Currently married		53.2		13.6	
Divorced/separated/widowed		44.9		0.0	
		100.0			
<b>MSM subgroup</b>			0.04		0.08
Non-anal sex MSM		46.4		11.9	
Anal sex MSM		63.5		20.6	
<b>HIV knowledge</b>			0.20		0.14
Aware of asymptomatic period	Yes	57.3		17.2	
	No	47.1		11.5	
			0.34		0.48
Aware of non-transmissibility by kissing	Yes	49.6		14.8	
	No	58.1		11.5	
			0.12		0.16
Aware of non-detectibility period	Yes	47.8		16.2	
	No	61.8		10.2	
			0.47		0.41
Aware of high infectivity of HIV	Yes	48.6		15.7	
	No	54.3		12.2	
Contracted an STD in last 6 months	Yes	33.3		17.9	
	No	53.3		12.1	
Believe that MSM has other MSM partners	Yes	46.9		19.8	
	No	61.4		11.5	
Has more than 3 MSM partners in P6M	Yes	57.4		20.0	
	No	49.1		11.8	
Joined HIV prevention activity	Yes	42.9		33.3	
	No	55.9		13.2	
Know someone with HIV	Yes	50.0		53.3	
	No	55.3		12.0	
<b>% Agreement with the following HIV related attitudes</b>					
The use of condoms is necessary when having sex with same sex partners	Yes	46.5		13.0	
	No	82.1		16.7	
The use of condoms would reduce the chance of HIV infection from anal sex with same sex partners	Yes	50.4		14.0	
	No	77.8		12.1	
The chance of contracting HIV is very high when having anal sex without using condoms	Yes	51.2		13.9	
	No	66.7		14.3	
You have total control in deciding to use condoms when having sex with same sex partners	Yes	51.3		12.7	
	No	61.8		19.1	
The chance of contracting HIV is very high from oral sex without using condoms	Yes	50.7		13.1	
	No	56.3		15.2	
Among the peers you know, most of them would use condoms when having sexual intercourse	Yes	51.0		14.8	
	No	56.6		11.2	

\*Only asked of those who engaged in oral sex. † $\chi^2$  test.

relationship (15.8%), reduction in physical pleasure (5%), condoms were not readily available (26.3%), and “other reasons” (21.1%).

The results of the multivariable logistic regression show that among anal sex MSM, independent predictors of condom use during the last episode of anal sex included belief that the chance of HIV infection via MSM activities was high (OR = 4.3 95% CI 1.2 to 15.8) and inclination to use condoms in the next 6 months for fear of AIDS (OR = 9.4, 95% CI 0.8 to 49.5).

In the last episode of anal sex, nearly half of the MSM partners were intimate friends. The rest of the anal sex MSM partners were strangers who were not male sex workers (30.8%), casual acquaintances (16.9%), and male sex workers (3.1%). About 37.5% of the anal sex MSM subgroup took the

insertive position in the last episode of anal sex; about 26.4% of them were the receptive partner only and 27.8% of them took both positions; 8.3% of these respondents did not answer the question. Over 30% (30.6% of non-anal sex MSM and 46.6% of anal sex MSM) believed that their MSM sex partners had other sex partners.

#### Factors associated with unprotected oral sex and testing for HIV antibodies

The results of the univariate analyses of factors associated with unprotected oral sex and HIV testing are shown in table 3. Those variables demonstrating statistically significant associations ( $p < 0.05$ ) were used in the multivariate analysis. In the multivariate analyses, the only statistically significant factor predicting whether or not the MSM practised

### Key messages

- The results of the study indicate that nearly one quarter (24.7%) of active MSM in Hong Kong practise anal sex
- Hong Kong MSM, particularly anal sex MSM, are at risk of contracting STD and HIV/AIDS, given the high prevalence of self reported STDs and such behaviours as frequent unprotected sex and multiple partnerships
- Attitudes of MSM are not favourable to HIV prevention as over half of the respondents stated that there is no possibility at all of becoming consistent condom users in the coming 6 months and about 60% of the anal sex MSM believed that there is no chance of contracting HIV in the future
- Condom availability is still an outstanding issue to be addressed

unprotected oral sex was whether or not the respondent agreed with the statement "the use of condoms is necessary when having sex with same sex partners" (OR = 5.3, 95% CI 1.9 to 14.8). The only statistically significant predictor of HIV antibody testing in the multivariable model was acquaintance with someone living with HIV/AIDS (OR = 8.4, 95% CI 2.8 to 24.9).

### DISCUSSION

Our results indicate that the prevalence of MSM (4.6% ever MSM) in the Hong Kong Chinese population is comparable with the 6.1% prevalence found by a previous pilot study<sup>22</sup> and with data obtained from the United States<sup>23</sup> and the United Kingdom.<sup>24</sup>

It has been suggested that MSM, especially anal sex MSM, are at high risk for HIV infection.<sup>16</sup> From the much higher prevalence of risk behaviours practised by the anal sex MSM subgroup, it is probable that the prevalence of HIV among the anal sex MSM subgroup is substantially higher than the prevalence for the overall MSM population. This speculation has important implications as it would require differentiating between MSM subgroups in the formulation of public health measures. Further research is still required to augment our understanding of these MSM subgroups.

In addition to the high prevalence of risk behaviours in active MSM, their attitudes towards HIV prevention and condom use are not favourable to HIV prevention. Over half of the respondents stated that there was no possibility of becoming consistent condom users in the following 6 months and that over 60% of the anal sex MSM believed that there was "no chance" of contracting HIV in the future. Believing that "MSM partners are disease free" and "fear of affecting the relationship" account for almost 50% of the most important reasons given by the anal sex MSM respondents for not using condom with their MSM partners, reduction in physical pleasure was only cited by 5% of the anal sex MSM respondents as a disincentive for condom use (unpublished data), and ready accessibility of condoms is still an important public health issue as almost 25% cited this as their primary reason for inconsistent condom use. The results of a previous study also noted that a high proportion of MSM behaviours took place in public venues.<sup>16</sup> Improving accessibility of condoms by placing vending machines in public toilets, saunas, and bars is thereby a promising means of promoting condom use.

Our multivariable results show that among active MSM, being acquainted with an HIV infected individual was associated with HIV antibody testing. As there have not

been any HIV positive MSM in Hong Kong who have publicly disclosed their HIV and MSM status, it may be promising to have such individuals involved in HIV prevention campaigns. Among active MSM, perceiving the necessity of condom use when having sex with MSM was associated with condom use when having oral sex with MSM. Among anal sex MSM, those believing that the infectivity of HIV via MSM activity was low were less likely to use condoms when having anal sex with MSM. Education programmes should thereby explain and promote the necessity of condom use as well as the risk of unprotected MSM sexual behaviours.

Integration of HIV and STD prevention programmes may also be a prudent strategy since the concern over contracting STDs was shown to be a far greater motivation for condom use among active MSM than HIV prevention. Additionally, the proportion of active MSM who contracted an STD in the past 6 months (5.7%) is similar to the 6.4% reported by male Hong Kong clients of female sex workers<sup>16</sup> but much higher than the percentage reported in the general male population (1.5%).<sup>22</sup>

As there has not been seroprevalence surveillance in the Hong Kong MSM population, the prevalence of HIV remains unknown. Based upon the 490 reported HIV cases attributed to MSM and an assumed 10% prevalence of MSM, the Hong Kong government has crudely estimated the HIV incidence rate for MSM for the year 2001 at 13.1/100 000 person years.<sup>25</sup> These approximations are likely to be underestimations. Firstly, the prevalence of MSM is shown in this study to be much lower than the assumed value used for the estimations (4.6% ever MSM, 2.0% active MSM). Using the data from this study, the rough HIV prevalence estimate would be 4.8 per 1000 for ever MSM and 10.4 per 1000 for active MSM. Other biases such as the relatively low levels of HIV testing among active MSM (13.9%) and the unwillingness of many MSM to disclose their true sexual orientation after testing positive for HIV would also lead to an underestimation HIV prevalence among MSM. A surveillance is urgently needed.

The study has the strength of being a large scale, random, population based study. The age composition of the sample of 16 000+ respondents were similar to that of the census population of males between the ages of 18–60.<sup>26</sup> Although there was a slightly higher (7%) representation of 18–25 years olds in our study sample with slightly lower representation (5%) of 45–60 years olds, any effects on our study results should be moderate. With such a sample size, we were able to obtain over 600 MSM respondents to the questionnaire, a sample larger than many international studies of this topic.<sup>24–27</sup> This study also confirms the feasibility of collecting sensitive information from a marginalised, vulnerable population by using a specially designed data collection methodology.<sup>21</sup> The results may be used as benchmark data of a future behavioural surveillance system for the MSM in Hong Kong.

One limitation of this study is the relatively small number of anal sex MSM captured by the survey. Yet, the cost of obtaining a random sample of 200 anal sex MSM would be prohibitive. The study's response rate (57%) may be another limitation, but the response rate is commonly between 50–60% for telephone surveys of a non-sensitive nature,<sup>28</sup> and the study's response rate is comparable with those of other risk behaviour surveys in the territory.<sup>22</sup> As most of the non-response was made before the study topic was revealed and since over 95% of those who began the sensitive part of the questionnaire completed the survey, it is unlikely that a strong bias as a result of non-response had been introduced. Another limitation is that STD data were self reported and the study may have missed subclinical cases. The data are limited to the Chinese population, as 94.9% of the Hong Kong

population is ethnically Chinese.<sup>29</sup> The prevalence of MSM behaviour among male expatriates is unknown. MSM research has been an understudied research topic in China and other non-Western countries. Further research into this group is warranted.

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## CONTRIBUTORS

JL is was responsible for the conception, questionnaire design and implementation of the study and interpretation of the data and drafting of the manuscript; JK was involved in the data analysis and the drafting and editing of the manuscript; ML and HYT were involved in the statistical analysis.

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