The Cardinal Number Estimation of Men Who Have Sex with Men, in China

Shaochun YANG [1], Ying FU [1], Yunhua ZHOU [1], Yuhua RUAN [2], Dongliang LI [3], *Ge GAO [1]

1. *Dept. of Epidemiology and Health Statistics, School of Public Health, Soochow University, Suzhou, China*
2. *Dept. of AIDS/STDs Prevention, Chinese Center for Disease Control and Prevention, Beijing, China*
3. *Dept. of AIDS/STDs Prevention, Chaoyang Center for Disease Control and Prevention, Beijing, China*

*Corresponding Author: Email: gaoge01@163.com

Dear Editor-in-Chief

An estimation of about 650,000 Chinese were living with HIV/AIDS in 2005 (1); MSM (men who have sex with men) have also become high-risk groups in the infection and spread of HIV/AIDS. In recent years, MSM accounted for the proportion of all new HIV-positive individuals jumped from 12.2% in 2007 to 32.5% in 2012 (1). AIDS high-risk groups, particularly MSM cardinality estimation, are an important foundation for the comprehensive and objective HIV testing analysis and master the basic situation of MSM to analyze and forecast HIV epidemic trends (2).

On the international, the cardinality estimation methods of AIDS high-risk groups mainly include two types of direct and indirect method (3-4). Most estimated methods cannot be used as statistical inference or not suitable for investigation on sensitive questions, so our team chooses multiple sources of CMR method as our experimental way for the advantages (5). This study selected two-stage random sampling method. Twenty-eight activities, 10 MSM VCT outpatient clinics, and 7 MSM websites in Beijing were selected in the first phase of random sampling; the second phase selected people from places which had been extracted before, at last, 1774 MSM were randomly selected from VCT outpatient clinic, MSM websites and activities. Sample size has been given by estimate formula according to Jianfeng Wang, Ge Gao (6). The participants among MSM have Beijing household registration and lived in Beijing more than six months. Moreover, the closure of the research field about one month guaranteed that this condition meet the demands.

This study collected 1774 samples; the youngest was 16 years old, and the oldest was 49 years old. Of recycling 1774 samples, 519 samples were from MSM activities, 752 samples came from VCT outpatient clinic, and 503 samples originated in gay website. Qualified questionnaires were 1766, of which the percent of pass was 99.5% Overall, 516 samples were from MSM activities, 747 samples came from VCT outpatient clinic, and 503 samples originated in gay website. In which 18.9% of respondents' domiciles were Beijing. The MSM who seek sexual partners in actual venues, MSM activities and gay website was significant. Three sources including actual venues, MSM activities and gay website were shown in Table 1.

Estimated cardinal numbers among MSM population of Beijing:

Table 1: Three sources of CMR incomplete contingency table

		VCT outpatient clinic			
		yes		no	
		gay website		gay website	
		yes	no	yes	no
MSM activities	yes	472	123	17	241
	no	108	503	302	—

$$\hat{N} = n + \frac{x_{111}x_{221}x_{122}x_{212}}{x_{121}x_{211}x_{112}} = 1774 + \frac{472 \times 503 \times 241 \times 302}{123 \times 108 \times 17} = 78283$$

Asymptotic variance $Var(\hat{N})$ was calculated by using different inner product of orthogonal projection and SAS programming iterative calculation, the result was as follows: $\sqrt{Var(\hat{N})} = 7682$. N 95% confidence interval of MSM population is calculated as follows: $\hat{N} \pm 1.96\sqrt{Var(\hat{N})}$ = -63226~93340. The cardinal number of MSM in Beijing was estimated to be 78283 (70601-85965).

According to NBS(National Bureau of Statistics) statistical yearbook in 2013 (7), the total resident population of Beijing was 20.693 million in 2012, of which 10.681 million were men, 15~49 years old of the population were 13.145 million so as to estimate 15~49 years old of male population approximately 6.785 million (1068.1/2069.3× 1314.5), and calculate the cardinal number of 15~49 years old MSM population in Beijing accounted for about 1.15% (78283/6785000)of the local male population at the same age paragraph, which is slightly higher than Wang li-yan(8) who estimated that 1%, but less than 2%~3% of Zhang bei-chuan reported in the literature (9).

The estimation of sampling size in two-stage sampling and its application in MSM survey through three sources were scientific. The new approach is highly available and valuable in the future survey on MSM population.

Acknowledgements

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