

# Comparing Samples of Men Who Have Sex with Men Recruited Online and in Venues, Jiangsu Province, China, 2013

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## Abstract

**Purpose:** Two common methods to sample men who have sex with men (MSM) for HIV research are venue- and internet-based approaches. However, it is unclear which is best to sample Chinese MSM.

**Methods:** We conducted side-by-side comparisons of time-location sampling (TLS) and an online sample of MSM in Nanjing, China.

**Results:** TLS-recruited MSM tended to be older and of lower socio-economic status compared to online-recruited MSM, whereas online-recruited MSM reported higher risk behavior and lower frequency of HIV testing.

**Conclusion:** Significant differences were observed between the two separate samples. Without a gold standard, the choice of sampling method or recruitment approach should be guided by the segment of the population targeted to be reached.

**Key words:** China, men who have sex with men (MSM), sampling, time location sampling.

## Introduction

CHINA'S HIV EPIDEMIC CHARACTERISTICS are low overall prevalence, with increasing numbers of people living with HIV/AIDS concentrated in key populations and an increasing proportion of infections attributable to sexual transmission, especially among men who have sex with men (MSM).<sup>1</sup> Cases attributable to sex between men have increased from 2.5% in 2006 to 13.7% in 2011, and multiple surveillance studies show increasing HIV prevalence among MSM in many Chinese cities.<sup>1-4</sup> Several cohort studies also documented alarmingly high incidence rates, ranging from 5.4 to 8.1 cases per 100 person-years.<sup>5-7</sup>

MSM in China face stigma and discrimination and are, thus, hard to reach for health programs and research.<sup>8</sup> Moreover, obtaining representative samples of MSM has many challenges, with most relying on convenience samples from the internet or respondent driven sampling (RDS).<sup>9-11</sup> Another option, time-location sampling (TLS) has been applied worldwide to sample MSM.<sup>12,13</sup> Prior to TLS, venue-based approaches to sampling MSM have often been convenience samples with their inherent lack of ability to make inference

to the population from which the sample is drawn.<sup>12-15</sup> Convenience samples simply go to the place where many potential study participants can be found, such as STD clinics or community services, accumulating samples as quickly as possible from any one or a few of these venues. TLS, in contrast, first compiles a comprehensive universe of venues where the population can be found then randomly selects venues and times at which potential participants can be approached during a set time period (e.g., 4 hours). In TLS, all venues have a chance for inclusion and, thus, all men attending those venues have a non-zero chance for inclusion. In convenience sampling, the sample can be filled up at a given venue giving the other venues and, thus, their patrons a zero chance of inclusion. However, TLS has only been used to sample MSM in one urban location in China.<sup>16,17</sup> Although a few studies have compared characteristics of MSM recruited through different sampling methods, none has directly compared TLS and online samples.<sup>14,15,18,19</sup> In the present study, we employed both internet and TLS to sample MSM for a study of social marketing for increasing HIV testing among HIV-negative or unknown status men. We then compared the characteristics of each sample and evaluated the relative merits of each approach.

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## Methods

### *Time-location sampling survey*

A cross-sectional study was conducted in the city of Nanjing, Jiangsu Province, China, from November to December 2013. A formative assessment phase gathered data on venues attended by MSM and the associated daytime periods when larger numbers of MSM congregated. These data were entered into a “universe” of venues which included the venue name and the days and times (venue day times [VDT]) during which MSM could be found. From the roster of all possible VDT a random sample of VDT was drawn without replacement for two weeks of sampling events at a time. At the selected VDT, the study team enumerated all possible MSM in a standardized time period (i.e., each sampling event was of the same duration) and individuals were approached for screening systematically. Successfully screened and eligible people were invited to complete a web-based self-administered survey on mobile broadband equipped tablet computers.

During assessment, recruiters briefly described the study. Men who had not previously participated and were willing to participate were screened for eligibility. Eligibility criteria included being male, aged 18 years and older, current physical resident of Jiangsu province (although official or hukou status could be elsewhere), had sex with a man in the past 12 months, and self-reported their HIV status as negative or unknown (being HIV-positive was an exclusion criterion because this was an intervention study designed to increase HIV testing uptake among HIV-negative or unknown status MSM).

The study obtained written informed consent from enrolled participants. Participants received 50 RMB (about 8 USD) in the form of pre-paid cell-phone cards for completing this questionnaire. In addition, in order to reduce repeat observations, during the data-management process, we double-checked the email address, QQ numbers (QQ is a very popular instant messaging service among Chinese MSM), and cell phone numbers. If observations had matching contact information all but the first observation were removed from the study database.

### *Online survey*

Between November 2013 to January 2014, the website Jiangsu Tongzhi (<http://www.jstz.org/>), popular among MSM in Jiangsu Province for social networking, information, and education, displayed a banner advertisement for the study. Potential subjects clicked through the advertisement to the study website which explained the study aims and invited individuals to undergo screening to participate. Only individuals who were deemed eligible were offered the opportunity to consent to participation and then allowed to continue with the main survey. To consent to the study, participants had to click the “Agree” button on the electronic informed consent. Eligibility criteria were the same as that in the TLS study. Participants who agreed to participate were automatically directed to the survey. Participants who completed the survey received a pre-paid cell-phone card worth 50 RMB.

In addition, in order to reduce repeat entries, the survey would only allow an individual IP address to access the survey one time. During the data-management process, we also double-checked the email addresses, QQ numbers, and cell phone numbers for duplication.

## *Measures*

Participants were asked about their age, educational level, marital status, living situation (i.e., cohabitation with a woman or man or others), employment status, official residence (*hukou*), and monthly gross income. They were also asked about their sexual orientation, and if they had disclosed their gay or bisexual identity to anyone. In terms of sexual behaviors with men, participants reported if they currently had a regular male partner and the length of their relationships as well as the total number of male anal sex partners in the past six months. In addition, they reported if condoms were used consistently or not with regular and casual anal sex partners when engaging in insertive and/or receptive anal intercourses, respectively. Finally, participants were asked if they had ever been tested for HIV and, if so, the number of times they were tested in the past year. This study had ethical approval from the University of California, San Francisco’s Committee on Human Research and the IRB of the Jiangsu CDC.

## *Statistical analysis*

We tabulated crude sample characteristics for both sampling approaches. For TLS data we employed a weighting scheme that accounted for the sampling fraction of each VDT. In addition, we specified clustering on the primary sampling unit (VDT). Point prevalence estimates and 95% confidence intervals (CI) were computed using SPSS 18.0. We used  $\chi^2$  to test for differences between the two sampling methods.

## **Results**

Based on formative research for TLS, we identified 10 venues where large enough numbers of MSM usually congregated (e.g., enough to ensure that 5 or more could be recruited). Of these 10 venues, 2 were bathhouses, 3 were bars, and 5 were parks, bathrooms, and public spaces. Daytime periods associated with the venues enumerated during the formative assessment were: bars, 22:00pm–0.00am and 23:00pm–1:00am; bathhouses, 15:00–17:00pm and 12:00–14:00pm; parks, bathrooms, and public spaces, 14:00–16:00pm; 18:00–20:00pm.

Implementing TLS over a two-month period, we enumerated 777 men at 23 randomly selected VDT periods. We attempted intercepts with 478 (61.5%) men, of whom 359 (75.1%) were intercepted and 342 (95.3%) agreed to be screened. A total of 290 (80.8%) men were eligible and 261 (72.7%) enrolled (10% were from bathhouses, 52% from bars, and 38% from parks, bathrooms, and other public venues). Notably, of the 342 men who agreed to be screened in TLS only 4 (1.2%) dropped out of screening at the ever had sex with a man question and only 2 (0.7%) of the 301 men asked HIV status declined to answer that question. Over the two months of implementing the online survey, we enumerated 985 men (i.e., the number who clicked on the ad) from the Jiangsu Tongzhi website. Of these, 823 (83.9%) were screened, 592 (71.9%) were eligible and 271 (32.9%) enrolled. Notably, of the 985 men who agreed to be screened online, only 40 (4.1%) dropped out of screening at the ever had sex with a man question and only four (0.6%) of the 623 men asked HIV status declined to answer that

TABLE 1. COMPARISON OF CHARACTERISTICS AND BEHAVIORS OF CHINESE MEN WHO HAVE SEX WITH MEN RECRUITED THROUGH TIME-LOCATION SAMPLING VERSUS ONLINE SAMPLING, JIANGSU PROVINCE, CHINA

	TLS (n=261)		Online (n=271)		P
	Crude, n	Adjusted, % (95% CI)	Crude, n (% , 95% CI)	$\chi^2$	
<b>Demographics</b>					
Age in years				14.4	.001
18–25	77	30.0 (28.1–31.8)	82 (30.3, 24.8–36.1)		
26–35	81	29.6 (27.3–31.9)	116 (42.8, 36.8–48.9)		
≥36	103	40.4 (36.7–44.0)	71 (26.2, 21.1–31.9)		
Missing	—	—	2 (0.7, 0.1–2.6)		
Education				37.4	<.001
Middle school or less	59	20.1 (17.6–22.5)	20 (7.4, 4.6–11.2)		
High school or technical	126	49.8 (46.3–53.2)	104 (38.4, 32.6–44.4)		
Some college or higher	76	30.1 (28.1–32.1)	147 (54.2, 48.1–60.3)		
Marital status				1.7	.431
Single	162	61.5 (58.4–64.6)	161 (66.8, 53.3–65.3)		
Married	78	31.2 (27.9–34.5)	74 (27.3, 22.1–33.0)		
Div/Sep/Wid	21	7.2 (5.8–8.7)	16 (5.9, 3.4–9.4)		
Cohabitate				11.2	.004
With a woman	50	19.4 (16.8–22.1)	51 (18.8, 14.3–24.0)		
With a man	65	24.6 (22.5–26.7)	42 (15.5, 11.4–20.4)		
Others	146	55.9 (52.6–59.3)	178 (65.7, 59.7–71.3)		
Full time employment	208	79.2 (75.2–83.2)	232 (85.6, 80.9–89.6)	3.7	.056
Hukou (official residence)				10.5	.001
Nanjing/Jiangsu	193	73.9 (69.8–78.0)	231 (85.2, 80.4–89.2)		
Other province	68	26.1 (23.8–28.4)	40 (14.8, 10.8–19.6)		
Income (RMB per month)				8.1	.017
≤2999	100	37.7 (34.3–41.3)	81 (29.9, 24.5–35.7)		
3000–4999	100	39.7 (36.9–42.4)	100 (36.9, 31.1–42.9)		
≥5000	61	22.6 (21.0–24.2)	90 (33.2, 27.6–39.2)		
<b>Sexual Identity and Behavior</b>					
Sexual orientation				5.1	.080
Gay	168	64.4 (60.8–68.0)	189 (69.7, 63.9–75.2)		
Bisexual	82	31.8 (28.8–34.7)	65 (24.0, 19.0–29.5)		
Heterosexual/Not sure	11	3.8 (2.8–4.9)	17 (6.3, 3.7–9.9)		
Told anyone your sexual orientation	155	58.8 (55.7–61.8)	136 (50.2, 44.1–56.3)	3.8	.051
Have a regular partner	121	46.2 (43.0–49.4)	115 (42.4, 36.5–48.6)	1.2	.280
How long with this regular partner (months)				3.2	.517
<3	14	5.6 (4.6–6.6)	17 (6.3, 3.7–9.9)		
3–6	13	6.0 (4.6–7.3)	19 (7.0, 4.3–10.7)		
7–12	24	9.2 (7.8–10.7)	26 (9.6, 6.4–13.7)		
13–36	26	9.0 (7.8–10.3)	24 (8.9, 5.8–12.9)		
≥37	44	16.4 (14.3–18.5)	29 (10.7, 7.3–15.0)		
No main partner	140	53.8 (50.3–57.2)	156 (57.6, 51.4–63.5)		
UIAI with regular partner in past 6 months	50	20.9 (18.5–23.4)	54 (19.9, 15.3–25.2)	0.1	.743
URAI with regular partner in past 6 months	34	13.9 (12.0–15.8)	42 (15.5, 11.4–20.4)	0.3	.578
Numbers of male anal sex partners in the past 6 months				13.8	.001
≤1	112	43.3 (40.0–46.6)	83 (30.6, 25.2–36.5)		
2–5	94	35.4 (32.6–38.2)	133 (49.1, 43.0–55.2)		
≥6	32	11.0 (9.7–12.3)	44 (16.2, 12.1–21.2)		
Missing	23	10.3 (8.9–11.7)	11 (4.1, 2.0–7.1)		
UIAI with casual partner in past 6 months	85	33.4 (30.6–36.2)	93 (34.3, 28.7–40.3)	0.1	.810
URAI with casual partner in past 6 months	53	20.8 (18.7–22.9)	89 (32.8, 27.3–38.8)	10.0	.002
<b>HIV Testing</b>					
Ever tested for HIV	218	82.3 (78.0–86.5)	189 (69.7, 63.9–75.2)	14.6	<.001
Times tested for HIV in the last year				9.4	.009
None	15	5.8 (4.5–7.1)	24 (8.9, 5.8–12.9)		
Once	87	32.8 (30.1–35.4)	91 (33.6, 28.0–39.5)		
Twice or more	116	43.7 (40.5–46.9)	73 (26.9, 21.7–32.6)		
Missing	43	17.7 (15.7–19.7)	83 (30.6, 25.2–36.5)		

TLS, Time-Location Sampling; CI, confidence interval; UIAI, unprotected insertive anal intercourse; URAI, unprotected receptive anal intercourse.

question. In addition, after cross checking the contact information provided by TLS and online participants, only 7 duplicate records were identified. In other words, only 7 men attempted to participate in both TLS and online surveys.

Table 1 compares characteristics of the TLS and online samples. The profile of MSM recruited by TLS and online differed significantly in that the TLS sample was older (40.4% over 35 years vs. 26.2%, respectively,  $\chi^2$  14.4,  $P$  = .001) and of lower socio-economic status (SES), as indicated by education (30.1% some college vs. 54.2%,  $\chi^2$  37.4,  $P$  < .001), hukou or migrant status (26.1% from outside of Jiangsu vs. 14.8%,  $\chi^2$  10.5,  $P$  = .001), income (22.6% over 5000 RMB per month vs. 33.2%,  $\chi^2$  8.1,  $P$  = .017), and borderline lower full-time employment (79.2% vs. 85.6%,  $\chi^2$  3.7,  $P$  = .056). TLS-recruited MSM were also more likely to be living with a male partner (24.6% vs. 15.5%,  $\chi^2$  11.2,  $P$  = .004).

MSM recruited online exhibited some higher levels of risk behavior compared to TLS-recruited MSM, reporting more male sex partners (e.g., 49.1% reporting two to five in the last six months vs. 35.4%, respectively,  $\chi^2$  13.8,  $P$  = .001) and more unprotected receptive anal intercourse (URAI) with casual partners in the last six months (32.8% vs. 20.8%,  $\chi^2$  10.0,  $P$  = .002). Meanwhile, TLS-recruited MSM were more likely to ever test for HIV (82.3% vs. 69.7%,  $\chi^2$  14.6,  $P$  < .001) and to test multiple times in the last year (43.7% vs. 26.9%,  $\chi^2$  9.4,  $P$  = .009). There were no significant differences between the samples in terms of having regular partners, length of time with partners, URAI and unprotected insertive anal intercourse (UIAI) with regular partners and UIAI with casual partners.

## Discussion

Some simple but important findings from our study should be emphasized. First, we demonstrate that it is possible to efficiently recruit fairly large numbers of MSM in a large Chinese city using TLS even when there are few venues and VDTs over a short period of time. To date, studies of MSM in China have typically been through convenience sampling, online sampling and RDS. Second, few men in either TLS or online samples refused to answer the HIV or MSM status questions at screening. This suggests that men are open to sharing personal information in research settings, opening up the possibility of specialized studies of sub-populations of MSM. However, we do note that there was a large proportion of eligible men who chose not to enroll in the online survey. While we can only speculate as to why this occurred, men could have lost interest once they read through the consent and or when they were asked to provide a mobile phone number. We also demonstrate substantial differences in the types of MSM likely to be recruited by the different sampling methods which is in itself a significant bias of each method. Without a gold standard of the basic characteristics of the population of MSM, the use of one approach over another must be guided by the need to reach different segments. In terms of demographic characteristics, it appears from our data that TLS reaches a lower SES segment of MSM than did the online approach, which also comes closer to matching the expected characteristics of Chinese men. In order to track the epidemic and prevention programs among more marginalized MSM it may be necessary to access these

men through TLS and venue-based interventions. However, the online participants reported higher sexual risk taking and less HIV testing than participants in TLS. Together the findings suggest the need to prioritize online prevention interventions, including promotion of HIV testing, for higher SES MSM while outreach programs are needed for lower SES MSM in China. Moreover, choosing one method over the other for projects where representativeness is desired, for example in prevalence studies, is not clearcut. However, based on our data, we would recommend the TLS approach as it produced a sample of MSM that more closely matches the demographics of Chinese men in general than did the online sample. Finally, in cases where a particular project's goal requires having the most diverse sample of participants it may well be that a multi-mode sampling strategy, such as TLS combined with online sampling, may make the most sense.

Our study has limitations. First, we recruited MSM from specific venues and from one website. It is possible that there are other less obvious physical venues and other websites that cater to other MSM. Moreover, our sampling approaches would not reach MSM who never go to any venues and do not use the internet. Furthermore, there is no gold standard sample of MSM in Nanjing or Jiangsu to validate if our approaches achieved a representative sample of MSM. However, RDS studies carried out by Jiangsu CDC achieved similar, but not exactly the same, demographic and risk profiles of MSM as our online sample survey.<sup>20</sup> However, this does not mean RDS and online sampling are superior to TLS just that they are similar.

## Conclusion

Despite limitations, we have demonstrated the possibility that multiple sampling methods can be used among MSM in China and that different sampling approaches may need to be used depending on the objectives of the planned research.

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## Author Disclosure Statement

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