

Preliminary Population Size Estimation of Men Who Have Sex With Men in Kazakhstan: Implications for HIV Testing and Surveillance

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Elwin Wu, PhD,¹ Assel Terlikbayeva, MD,² Timothy Hunt, MS,¹ Sholpan Primbetova, MS,² Yong Gun Lee, MS,¹ and Mark Berry, PhD³

Abstract

Purpose: The purpose of this study is to estimate the population size of men who have sex with men (MSM) in Kazakhstan and their HIV testing history.

Methods: We conducted structured interviews with MSM in four geographically disparate cities— $N=400$ ($n=100/\text{city}$)—to implement four population estimation methods and ascertain HIV testing history.

Results: Approximately 3.2% of men—corresponding to ~154,000 individuals—in Kazakhstan aged 18–59 are MSM. The 49.9% of the sample who reported taking an HIV test far exceeds the <1% reported as MSM in surveillance data.

Conclusion: HIV testing surveillance in Kazakhstan has underestimated the number of MSM. This underscores the need to redress social and structural barriers to HIV testing and disclosure of sexual behavior experienced by MSM in Kazakhstan. Recommendations include promoting cultural sensitivity among testing staff through quality assurance and regular training, and increasing protection and public awareness through antidiscrimination policy development.

AU5 ▶ **Keywords:** men who have sex with men, International research (research outside the US), HIV/AIDS, health screening

Introduction

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HIV INCIDENCE IN Kazakhstan increased by >25% between 2001 and 2011.¹ Men who have sex with men (MSM) are disproportionately burdened by the epidemic.² Several risk factors including multiple sex partnerships, unprotected anal intercourse, transactional sex, substance use, sexual violence history, and criminal justice involvement have been identified in MSM across Central Asia.³ The one published study to date focused exclusively on MSM in Kazakhstan found HIV prevalence of 20%, and high levels of engagement in sexual risk behavior, which in turn were associated with sexually transmitted infections, noninjection substance use, and transactional sex.⁴ Engagement in the HIV care continuum—from testing to treatment—mitigates transmission and prevalence. However, pervasive social stigma and state-sanctioned violence against MSM limit not only their access to care, but also disclosure of sexuality.^{5,6}

In 2010, UNAIDS reported that 60% of MSM in Kazakhstan received an HIV test in the prior year.⁷ Meanwhile, national HIV test surveillance data categorized only 331/815,680 (0.04%) of 18–59-year-old men as MSM; the number and proportion varied among four HIV epicenters: 199/214,314 (0.09%) in Almaty; 33/187,860 (0.02%) in Astana; 5/112,363 (<0.01%) in Pavlodar; and 4/356,372 (<0.01%) in Shymkent (HIV testing surveillance data provided on 27 June 2016 from the Republication Center on Prevention and Control of AIDS [RAC] and can be obtained upon request from the Epidemiology Department in the RAC office).

Hypothetically, it is possible that there are indeed very few MSM in Kazakhstan, and the majority of them obtain HIV testing annually. However, given their hidden nature, MSM identified in the surveillance data could very well be underrepresented. Validation/refutation of this hypothesis is best accomplished by simultaneously assessing the size of the MSM population in Kazakhstan and their level of

¹Social Intervention Group, Columbia University School of Social Work, New York, New York.

²Global Health Research Center of Central Asia, Almaty, Kazakhstan.

³Centers for Disease Control and Prevention, Atlanta, Georgia.

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engagement in HIV testing. Moreover, accurate population size estimation is crucial for multifaceted HIV prevention efforts involving “advocacy, resource allocation, intervention planning, program monitoring, and evaluation.”⁸ This study used multiple population size estimation methods in four geographically disparate cities to estimate the proportion and number of 18–59-year-old men who are MSM in Kazakhstan.

Methods

From each of the aforementioned four cities, we recruited MSM from “MSM-serving” sites from August to October 2011. MSM-serving sites in each city included an MSM-serving nongovernmental organization (NGO), a business/market location frequented by MSM (e.g., café, flower market), a daytime public social venue frequented by MSM (e.g., park, river walk), and a nighttime social venue frequented by MSM at night (e.g., disco, bar). Trained study staff from an MSM-serving NGO approached “every n th person”—where n was set to achieve target sample size in ~ 2 weeks of recruiting and generally ranged from 2 to 10—and asked about his interest and willingness to complete a 15–30 minute survey. Refusal rates ranged from 55% in Almaty to 75% in Pavlodar, with the vast majority declining due to lack of time followed by unwillingness to engage with someone conducting a survey. Inclusion criteria included (1) age 18 or older, (2) residency in the city of the survey, (3) identification as male, and (4) affirmative response to ever having had sex without coercion with another man. Initially, there were no *a priori* exclusion criteria, but cis- and transgender status were assessed and two transwomen that were recruited from MSM were excluded from the analyses due to the number being too small to be representative; no respondents indicated being transmen. Respondents were prompted to indicate/move to an appropriate place/nearby location, which would provide sufficient privacy to respond to questions that might involve personal information (e.g., sexuality, HIV testing experiences); about 10 indicated and returned for an interview at a more private time/location they arranged with the study staff. Verbal consent was obtained and documented. These procedures yielded a final sample size of $N=400$ MSM (100/city) for all estimation methods. The aforementioned procedures were the same in all study cities and venues. The Institutional Review Boards of the Kazakhstan School of Public Health (Almaty, Kazakhstan) and Columbia University (New York, NY) approved the aforementioned study procedures.

Data collection: structured interviews

Willing and eligible respondents were administered a 15–30 minute structured interview that elicited self-reported data needed to confirm eligibility, assess whether the respondent met criteria to be categorized as an MSM, employ several population size estimation methods, and verify ever having had an HIV test, and, if so, whether the most recent test was in the prior year.

Estimation methods

In the absence of a widely accepted gold standard for estimating the size of hidden and/or hard-to-reach populations⁸ such as MSM in Kazakhstan, we focused on and selected the

methods for which the necessary data could be collected from an individual respondent quickly and with minimal participant burden (e.g., a 15–30 minute structured interview could elicit the necessary data for estimation for the methods). In addition, data collection in a city had to be completed in less than 2 weeks.

Capture-Recapture method with repeated entries⁹: This method—originally developed by ecologists—allows extrapolation of a population size based on the overlap and nonoverlap of participants who are present in each of the MSM venues using the conventional Schnabel estimator¹⁰:

$$N = \frac{\sum_{i=1}^S (C_i M_i)}{\sum_{i=1}^S R_i}$$

where S is the total number of sites ($S=4$ for this study), C_i is the number of individuals counted in the i th sample, M_i is the number of individuals already counted before the i th sample, and R_i is the individuals in the i th sample already found or counted in prior samples. We examined the data for violation of the assumption that visiting sites were independent of each other by testing model fits using log-linear analysis in accordance with Frischer¹¹ separately for each city. The fit of the independence model was satisfactory for all cities—Almaty ($\chi^2=14.6$, $df=95$, $P=0.99$), Astana ($\chi^2=1.3$, $df=93$, $P=0.99$), Pavlodar ($\chi^2=0.7$, $df=95$, $P=0.99$), and Shymkent ($\chi^2=26.1$, $df=89$, $P=0.99$)—and no significant interaction terms were detected. Thus, we conclude that assumptions of independence were not violated.

Network Scale-Up Method (NSUM)¹²: NSUM assumes that respondents’ social networks are representative of the characteristics of the whole population where they reside; these “samples” provide the basis for estimation of the proportion of subgroups in the population with the following equation:

$$\hat{e} = \frac{\sum_i msm_i}{\sum_i \hat{c}_i} N$$

where \hat{e} is the estimated size of the target population, msm_i is the number of MSM in the city known by person i , \hat{c}_i is the estimated network size of person i , and N is the general population size in the respondent’s city. Data were collected to enable two different NSUM approaches to estimate \hat{c}_i : the Summation approach drew from categories used by Killworth;¹³ the Known Populations approach used the following categories and national census data: men 20–30 years old; women ≥ 65 years old, children born, people married, people divorced, Uzbeks, Tajiks, men incarcerated, and women incarcerated. Transmission error correction followed procedures described by Paniotto et al.¹⁴

Wisdom of the Crowds¹⁵: This estimation method rests on the premise that individual estimates obtained from a sufficient number of individuals from the target population in aggregate can yield an accurate estimate. We prompted each participant to report his best guess as to the total number of MSM in the city in which the interview had taken place twice: once before the questions related to NSUM were administered, and then at the end of the interview. Analyses utilized responses given to the question asked at the end of the interview, with the thinking being that these estimates may be more valid in a respondent’s mind since he was asked

TABLE 1. ESTIMATES OF THE POPULATION SIZE OF 18–59-YEAR-OLD MSM (AND 95% CONFIDENCE INTERVAL) IN FOUR CITIES BY ESTIMATION METHOD

Method	Almaty	Astana	Pavlodar	Shymkent
Capture-recapture	25,100 (20,400–32,600)	14,500 (12,600–17,200)	2290 (2040–2590)	17,700 (14,700–22,300)
NSUM: summation	26,400 (22,700–30,000)	14,400 (12,000–16,900)	8330 (7280–9390)	9810 (8000–11,600)
NSUM: known populations	9320 (6770–11,900)	4220 (3180–5230)	1970 (1610–2340)	3790 (2700–4870)
Wisdom of the crowds	12,000 (10,000–15,000)	4000 (3000–5000)	3000 (2500–3000)	2000 (1800–3000)

MSM, men who have sex with men; NSUM, network scale-up method.

to count/total MSM in his network before these questions. To minimize the influence of outliers and those who are poor candidates to provide a plausible estimate, the aggregation method used the median of the nonzero responses.

Results

T1 Estimates of the number of MSM using the four population size estimation methods (Table 1) ranged from 9320–26,400 in Almaty; 4000–14,500 in Astana; 1970–8330 in Pavlodar; and 2000–17,700 in Shymkent. The Capture-Recapture method and the NSUM using the Summation approach yielded the higher estimates. The NSUM using the Known Populations approach and the Wisdom of the Crowds method yielded the lower estimates. The NSUM by Summation appeared to have the highest precision (i.e., the width of the 95% confidence intervals as a fraction of the point estimate); this is followed from the highest to the lowest by Capture-Recapture, Wisdom of the Crowds, and NSUM by Known Populations.

T2 Averaged across methods weighted by precision, the estimated proportion of 18–59 year-old men in each city who are MSM (Table 2) ranged from 0.9% in Pavlodar to 4.2% in Almaty. Weighting each of these summary estimates by the population size of each city suggests that 3.2% of 18–59-year-old men in Kazakhstan are MSM. Half (49.9%, $n = 199$) of the MSM in the total sample reported taking an HIV test in the prior year.

Discussion

The overall estimate, 3.2% of 18–59 year-old men, corresponds to about 154,000 individuals. While estimation methods generated different results, such variance has been noted and attributed principally to the extent to which theoretical assumptions, on which a method relies, are likely to vary based on geography, sampling, sample size, and others. (see Abdul-Quader et al.¹⁶ for a summary and review). The variance in estimates in this study are similar to those published for a recent MSM population estimation using multiple methods in Tbilisi, Georgia.⁸ For the methods that resulted generally in lower estimates, the NSUM using the Known Populations approach relies on having valid counts of the number of individuals in the reference categories, and the

Wisdom of the Crowds method can allow respondents to provide unrealistic responses. For the methods that yielded higher estimates, the Capture-Recapture method and the NSUM using the Summation approach relied on multiple questions, which may cause the respondent to correct or cross-check his responses.

In addition to the lack of a gold standard for estimation, we acknowledge several other limitations. First, these data were collected a little over 4 years ago; nonetheless, we posit that the population size of MSM is fundamentally unlikely to change substantially in 4–5 years. Second, MSM may be more inclined to migrate to urban centers, thus MSM representation among these four cities may not be representative of the whole country. Third, the sampling and recruitment period in each city was brief (i.e., ~2 weeks)—and combined with the high but understandable refusal rate—it is unclear how representative the population is over a larger temporal range.

In our sample of 400 MSM, 199 reported receiving an HIV test in the prior year. This rate, 49%, is similar to the rate observed by UNAIDS.⁷ The number of MSM reporting receiving an HIV test in the prior year in our sample of just 400 MSM is almost equal to the total number (from HIV surveillance data reported above) of MSM identified from *all* HIV tests in the four cities. Altogether, these results suggest that MSM are not effectively reached and/or inaccurately identified during HIV testing in Kazakhstan.

Conclusion

We believe this is the first nationwide population size estimation of MSM in Kazakhstan. Furthermore, it can be used to bolster the country's agenda and action for HIV prevention by informing the scope, content, structure, and other possibilities of interventions for MSM. This study's findings indicate that surveillance methods are underestimating the number of MSM; this underscores the need to not only develop and sustain HIV interventions, but also to redress social and structural barriers experienced by MSM in Kazakhstan. Human rights plays a key role in the health and health equity for MSM in Kazakhstan, including reaching the 90-90-90 AIDS treatment target.¹⁷ Stigma and violence against MSM, manifest in anti-gay rhetoric and policing practices,¹⁸ render the environment for intervention delivery hostile and unwelcoming, thus discouraging MSM's entry to HIV care.⁵ Efforts must be made to expand MSM's access and linkage to services along the HIV care continuum. Recommendations include promoting cultural sensitivity in service locations and among staff through quality assurance and regular training, and also raising public awareness of inclusion through anti-discrimination policy development.^{19,20}

TABLE 2. PROPORTION OF 18–59-YEAR-OLD MEN ESTIMATED TO BE MSM BY CITY

Almaty	Astana	Pavlodar	Shymkent
4.2%	2.2%	0.9%	1.9%

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Author Disclosure Statement

No competing financial interests exist.

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Address correspondence to: ◀AU4

Elwin Wu, PhD
Social Intervention Group
Columbia University School of Social Work
1255 Amsterdam Avenue
New York, NY 10027

E-mail: ew157@columbia.edu

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