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Estimating the size of Men who have Sex with Men (MSM) using modified Capture-Recapture method based on network sampling in the capital city of Georgia in 2014

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Background

Estimates of the number of people at high risk for HIV infection are crucial for prevention, treatment and care planning. Taking into consideration that Georgia is the country, where HIV prevalence is concentrated among MSM and information on the size of this key population was lacking, we conducted the study using seven different population size estimation methods in Tbilisi, Georgia. We want to focus on a new method proposed by Dombrowski among methamphetamine users in 2012. This represents capture-recapture using network sampling technique. Among MSM we first time applied this method with few modifications.

Methods

Modified capture-recapture requires single sample, which for our study was 210 MSM 18 years and older recruited through Respondent Driven Sampling. The study participants were asked about their personal characteristics (approximate height, weight, hair color and ethnicity) and so called "telefunken codes" derived from the last four digits of their own mobile number.

Coding for Telefunken

Phone number ending with any of the following:	Initials	
1 2 3 4	Low	L
5 6 7 8 9	High	H
0 2 4 6 8	Odd	O
1 3 5 7 9	Even	E

Coding for personal identifiers

Approximate Height	Initials
Short	S
Medium	M
Tall	T
Approximate weight	Initials
Thin	T
Normal	N
Obese	O
Hair color	Initials
Dark	D
Light	L
No hair	N
Nationality	Initials
Georgian	G
Armenian	A
Other	Please specify

In difference to the original method that used six personal identifiers we dropped eye color (based on piloting results) and gender. This represented the capture. Afterwards the study participants were asked to provide the similar characteristics appealing to their five MSM contacts randomly selected from mobile phone directories. This represented the recapture. Some respondents (2.38%) did not have mobile phones with them and some did not have five MSM contacts in their mobile phone directory. To get to the final estimates Lincoln-Peterson method was used.

An example for coding



	Descriptives	Codes	Descriptives	Codes	Descriptives	Codes
Phone number	*****3563	EEOE	*****1842	E000	*****4586	OEOO
Height	168 cm	S	185 cm	T	176 cm	M
Weight	108 kg	O	63 kg	T	78 kg	M
Hair color	Dark	D	Light	Light	Ginger	G
Nationality	Georgian	G	Russian	R	Armenian	A

Results

Using the four-identifier categorical variables and the "telefunken code", we identified 36 matches between the two captures (205 captured and 770 recaptured). This led to the population size of 1.2% (95%CI, 0.9% - 1.6%) of the adult male population. The results were comparable to those from other methods used in our study:

PSE method	Point estimate (18-59y)	Lower Bound (18-59y)	Upper Bound (18-59y)
Modified Capture-Recapture	4,385	3,115	5,654
MSM size - Median of all seven estimates*	5,100	3,243	9,088
MSM Prevalence in adult population	1.42%	0.90%	2.53%

*Estimates derived from the following methods: Network Scale-up, Web- and mob- App Multipliers, Service Multiplier, Unique Object Multipliers, RDS-based Handcock, Wisdom of Crowd, Modified Capture-Recapture

Conclusions

Despite the study limitations - difficulty to get the "telefunken codes" for the recapture phase - modified capture-recapture method provides reasonable population size estimates for MSM when compared to the median estimates and their boundaries of other more established methods. Estimating size of MSM through modified capture-recapture method appeared to be feasible, simple, cost-saving and effective method that is valuable for future application.