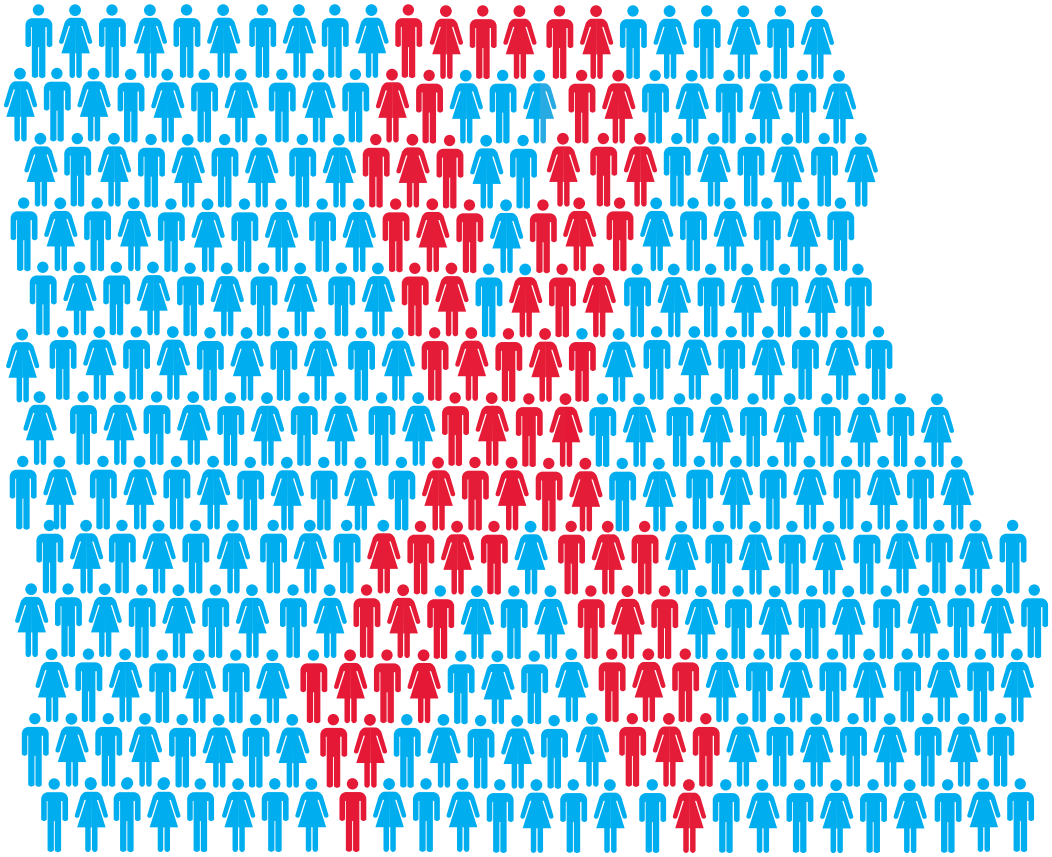
SIZE ESTIMATION OF KEY AFFECTED POPULATIONS AT ELEVATED HIV RISK IN EGYPT, 2014



drosos (...) UNAIDS UNODC United Nations Office on Drugs and Crime UNFPA NAP

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Jerry O. Jacobson, Ph.D.

Tobi J. Saidel, Ph.D.

Virginia Loo, Ph.D.

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Roayah Association for integrated development

Youth Assocaition for Population and Development-YAPD

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Abbreviations and Acronyms

BBSS	Biological and Behavioral Surveillance Survey
FSW	Female sex worker
KAP	Key affected population
KI	Key informant
MOH	Ministry of Health and Population
MSM	Men who have sex with men
NAP	National AIDS Program
NGO	Non-governmental organization
NSF	National Strategic Framework
PEMA	Partnership for Epidemic Analysis
PSE	Population size estimate
PWID	People/Person who injects drugs
RDS	Respondent-driven sampling
STI	Sexually transmitted infection
TWG	Technical Working Group
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNODC	United Nations Office on Drugs and Crime
YAPD	Youth Association for Population and Development
US$	United States Dollar

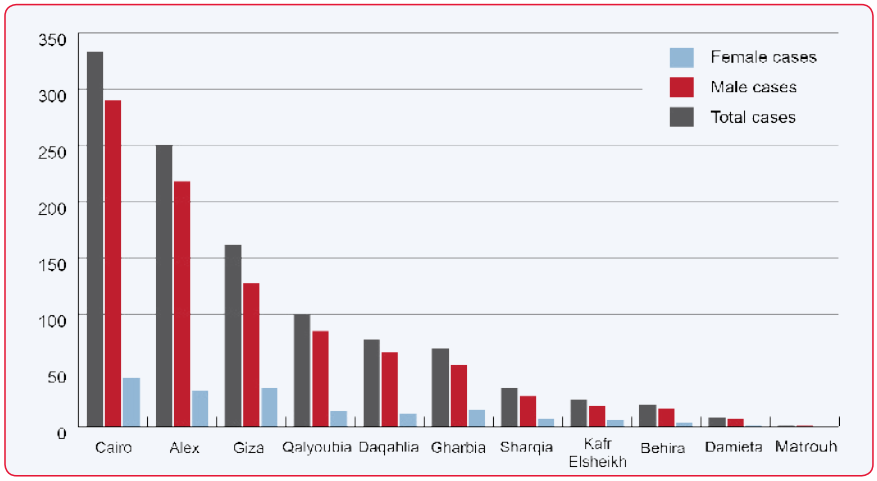
INTRODUCTION

The overarching goal of Egypt's HIV/AIDS National Strategic Framework for 2012-2016 (NSF) is to stabilize the growth of the AIDS epidemic in the country. In recognition of the evidence pointing to elevated levels of HIV infection among men who have sex with men (MSM), people who inject drugs (PWID) and female sex workers (FSW), the NSF's first programmatic priority is to prevent new infections in these key affected populations (KAPs).

Findings from targeted surveillance studies indicate elevated levels of HIV infection among MSM, PWID and FSW; the 2010 Biological and Behavioural Surveillance Study in Cairo, Alexandria and Luxor and a 2012 MSM study in Tanta reported HIV prevalence between three per cent and seven per cent in these groups.[1]

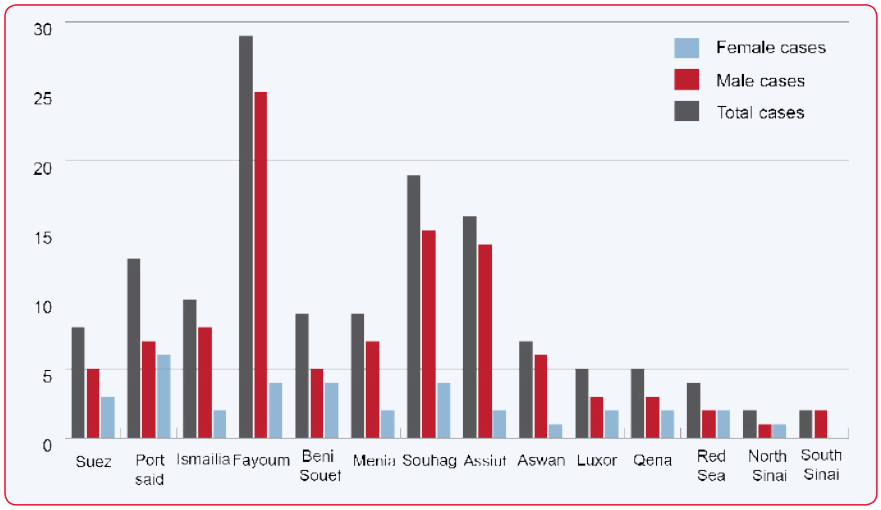
Twenty per cent of reported HIV cases in Egypt in 2010 occurred among MSM and 28 per cent among PWID[2] . Additionally, 83 per cent of the 1,229 HIV cases reported during 2012 and 2013 occurred among males (Graph 1.1, 1.2), which is consistent with an epidemic that disproportionately affects MSM and/or PWID (as PWID globally tend to be males) relative to the general population.

Graph 1.1: Sex of reported HIV cases, 2012-2013 in lower Egypt and Suez canal region



FEMALE CASES:
Maximum: Cairo 43
Minimum: Matrouh 0
MALE CASES:
Maximum: Cairo 290
Minimum: Mattrouh 1

Graph 1.2: Sex of reported HIV cases, 2012-2013 in lower Egypt and Suez canal region



FEMALE CASES:
Maximum: Port Said 6
Minimum: South Sinai 0
MALE CASES:
Maximum: Fayoum 25
Minimum: North Sinai 1

[1] *Kabbash IA, El-Rahman IA, Zeidan O., HIV infection among men having sex with men in the Nile Delta, Egypt, 2012*
[2] *Egypt, Ministry of Health and Population. HIV/AIDS Situation, Response, and Gap Analysis, (Cairo, 2010).*

Estimating the size of key populations is critical to the prevention programmes prioritization and planning efforts and to track programme coverage over time. For example, NSF has established target coverage levels of 50 per cent of FSW, 60 per cent of MSM and 60 per cent of PWID reached by prevention programmes in prioritized governorates. In addition, size estimates are needed for epidemiological models that track how the epidemic is evolving over time. Thus, they are central to both the epidemiological surveillance and monitoring, and to the evaluation systems[3] . Recognizing this, NSF Priority Area 5 emphasizes strengthening strategic information, including strengthening KAP size estimates.

Developing size estimates for MSM, FSW and PWID, however, is challenging. These are hidden populations facing high levels of social stigma. Injection drug use and selling sex are illegal in Egypt; Therefore PWID and FSW face considerable risk when disclosing such risk behaviours through participation in surveillance or research. While Egyptian law does not explicitly prohibit sex between males, MSM have been subject to persecution and arrest under charges of "debauchery" since at least 2001[4] . In 2013, another series of much publicized crackdowns against MSM began and were taken into consideration when developing the population size estimate (PSE) protocol as well as interpreting the findings.

Previous studies developed size estimates for PWID in Cairo in 2004, and for MSM in Cairo and Alexandria in 2009[5] . To the best of our knowledge, the present study represents the first effort to estimate MSM, FSW and PWID numbers in other governorates, based on national data

[3] UNAIDS/Wrold Health Organization's Working Group on Global HIV/AIDS and STI Surveillance. Guidelines for second generation HIV surveillance: an update: Know your epidemic, available from http://apps.who.int/iris/bitstream/10665/85511/1/9789241505826_eng.pdf

[4] Human Rights Watch. In a Time of Torture: The Assault on Justice in Egypt's Crackdown on Homosexual Conduct" available from https://www.hrw.org/reports/2004/egypt0304/; Lucas Paoli Itaborahy and Jingshu Zhu, State-Sponsored Homophobia: A world survey of laws: Criminalisation, protection and recognition of same-sex love, available from http://old.ilga.org/Statehomophobia/ILGA_SSHR_2014_Eng.pdf

[5] Egypt, Ministry of Health and Population. HIV/AIDS Situation, Response, and Gap Analysis, (Cairo, 2010).

OBJECTIVES

The aim of the study was to estimate the number of MSM and FSW in Egypt at the governorate and national levels and the number of PWID in selected governorates.

The study focused on individuals who currently engage in these behaviors.

INITIAL ASSESSMENT

The study began with a preliminary phase to inform on development of the study protocol. An initial assessment was undertaken to determine the most appropriate methodology for size estimation given the available time and resources. The initial assessment included three steps:

1. Desk review of available size estimates and other data on KAPs;
2. Interviews with key informants (KIs) and KAP members to explore feasibility of potential size estimation methods; and
3. TWG and Steering Committee deliberations to establish the study methodology

The desk review aimed to characterize previous size estimates, potential barriers and facilitators for size estimation, as well as data available to guide the selection of governorates for primary data collection. Data were sought regarding indications of the likely size of each group, evidence of epidemic potential, and the presence of programmes targeting KAPs. Data sources included peer-reviewed papers, published and draft reports of research and surveillance studies, national reports on the epidemic and programmatic reports from organizations working with KAPs.

Following the desk review, structured interviews with KIs were carried out during July 2014 in Cairo. Interviews were conducted with 12 KIs for MSM, 13 KIs for FSW and ten KIs for PWID. KIs were primarily outreach workers and management-level representatives from HIV prevention programmes working with the respective populations.

The interviews aimed to identify the size estimation methods that would likely be most effective in KAPs and to adapt these methods to the local context. Interview themes included:

- Characterizing KAPs in terms of demographics and risk behaviours
- The types of locations frequented by KAPs
- How the populations use Internet web sites and cell phone-based geo-social applications to meet partners
- The acceptability and likely effectiveness of mapping approaches to size estimation
- The extent of overlap that would likely be encountered when mapping physical and/or virtual locations
- The availability of services targeting KAPs, their locations and perceptions of how their reach may be limited to particular segments of the population
- The availability of data from programmes and services to support size estimation

Detailed methods and findings are described in the project's "Inception Report". The resulting strategy is described below.

MEN WHO HAVE SEX WITH MEN AND FEMALE SEX WORKERS

Methods

Overall estimation strategy

Due to both limited resources and the understanding shared by stakeholders that MSM and FSW engage in risk behaviors predominantly in urban areas, the estimates developed represent the key populations found in urban areas of Egypt. Defining the population represented by the size estimate in this way does not necessarily exclude MSM and FSW who reside in rural or peri-urban areas provided they come to urban areas to meet sex partners. The resulting estimate is assumed to represent the most important components of the risk network contributing to the national HIV epidemic.

The overall approach to developing the size estimates for urban MSM and FSW was to:

- Divide the country into geographic regions
- Develop a 'local' mapping-based size estimate in one governorate in each region
- Extrapolate the local size estimates to the remaining governorates in the same region based on census population
- Sum the governorate-level size estimates to obtain the national size estimates

Selection of governorates for data collection

Governorates were grouped into regions following the regional groupings used in national Demographic and Health Surveys. Cairo and Giza were treated as a single governorate for planning given that they represent contiguous and highly connected urban areas. Initially, the TWG sought to group governorates based on similarity in terms of level of risk behaviors and HIV/STI disease burden in the target populations. However, such data were not available for the vast majority of governorates. Previous HIV/STI surveillance studies and outreach programs for key populations were available only for the largest cities.

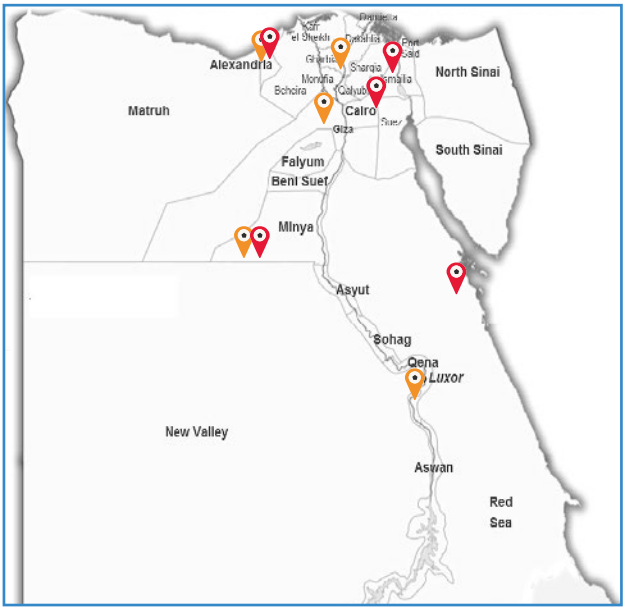
In each region, one governorate was selected to develop a "local" size estimate that would then be extrapolated to the remaining governorates in the same region. Initially, we sought to select at least two governorates per region, representing both "high epidemic" and "low epidemic" scenarios, in order to have a more fine-grained approach to extrapolation. However, resources available for the study limited primary data collection to 4 or 5 governorates per population. Thus, at most one governorate per region could be selected. To ensure feasibility of data collection, governorates were selected based on the presence of an NGO with experience working with the target population.

The selected governorates are shown in Table 1 with an asterisk ("*"). These were often the largest or near largest governorates in their respective regions. The TWG deliberated the potential bias of extrapolating from larger governorates to smaller governorates. However, the TWG concluded that there was no evidence that levels of risk behaviors were any different in urban areas of smaller governorates. Thus, the extrapolation was carried out assuming the same ratio of the size of the risk group relative to the urban census population.

Sinai governorates were excluded from the estimation due to security concerns. For MSM, New Valley and Red Sea governorates were also excluded due to limited resources for data collection. For FSW, Aswan, Luxor and New Valley were similarly excluded. The excluded governorates were not considered similar enough to other governorates to allow for estimation by extrapolation. Together they represent only two per cent of the general population of males and four per cent of the general population of females according to the national urban census.

Table 1.Regional grouping of governorates and urban census population

Region / Governorates	MSM Urban males ages 18-59	FSW Urban females ages 15-49
Greater Cairo		
Cairo and Giza	(*) 3,925,747	(*) 3,617,666
Qalyoubia	651,280	595,017
Northern Coast		
Alexandria	(*) 1,362,802	(*) 1,251,070
Matrouh	87,455	74,424
Upper Egypt, touristic		
Luxor	(*) 123,427	(*) 112,893
Aswan	172,032	157,630(e)
Upper Egypt, other		
Menia	(*) 269,546	(*) 252,686
Assiut	316,269	288,130
Beni Souef	182,700	171,807
Fayoum	199,944	181,855
Qena	167,811	157,135
Souhag	274,797	253,840
Delta and Suez Canal		
Delta		
Gharbia	(*) 398,285	378,317
Behira	310,232	287,595
Daqahlia	469,699	441,890
Damieta	147,206	134,518
Kafr Elsheikh	203,093	194,610
Monoufia	228,328	211,406
Sharqia	424,033	(*) 390,827
Suez		
Ismailia	146,752	139,572
Portsaid	191,399	176,681
Suez	175,986	162,350
Red Sea	111,867(e)	68,446
Sinai		
North Sinai	75,232(e)	65,387(e)
South Sinai	31,466(e)	16,062(e)
New Valley	30,939(e)	27,866(e)



Mapping approach

In the selected governorates, mapping was conducted to develop a size estimate. Mapping-based size estimation methods attempt to quantify the part of the population that frequents specific venues and/or online websites, and which can be readily identified by outreach workers.

Mapping of MSM was conducted at physical venues ("geographic mapping") and MSM Internet hookup sites ("virtual mapping"). Mapping of FSW was conducted only at physical venues (Table 3).

Virtual mapping of FSW was not conducted. Although interviews with FSW outreach workers during the initial assessment indicated that some FSW in Egypt use Internet web sites to meet sex clients, the web sites mentioned, such as Facebook.com and Badoo.com are not specific to FSW. They are also utilized for social networking and dating. Initially, the study protocol envisioned screening the profiles of women on these

Note: * = Selected for mapping,
(e) = Excluded from estimation due to limited mapping resources or security

web sites to determine whether they were FSW, based on tell-tale signals well known to outreach workers. However, this proved infeasible. Study staff reviewed 30 profiles of females on Badoo.com, which were selected at random, and concluded that without first engaging by chat or email, there is no way to determine that the individual is actually seeking to sell sex.

Definition of the "population"

For purposes of the estimates, the target populations were defined as individuals who currently engage in the risk behaviors of interest. In practice, the estimates counted individuals present at physical venues in urban areas. The MSM estimates also count individuals on MSM Internet hookup sites in the selected urban areas.

TWG considered adopting population definitions that included a reference period, for example, sex with another male in the past 12 months or receiving money in exchange for sex in the past six months. However, in a mapping exercise, it is generally not feasible to screen all or most individuals present in order to determine whether they satisfy such a reference period. Furthermore, during the interviews and focus groups carried out during the initial assessment, KIs felt that, given the environment of active MSM and FSW policing, interaction with venue-goers should be kept minimal. Therefore, MSM and FSW were identified by study staff (who were experienced outreach workers) based on appearances, gestures and behaviours. Operational definitions are presented in table 2.

Table 2. Population definitions by mapping modality

Population	Geographical Mapping	Virtual mapping
MSM 	Males present at known MSM venues who were identifiable as MSM to outreach workers, based on appearance and behavior	Individuals online on MSM-specific Internet hookup sites, whose profile indicated they were male, age 18 or older, and seeking a male partner in the respective governorate
FSW 	Females present at known FSW venues who were identifiable as FSW to outreach workers, based on appearance and behavior	Not Conducted

Therefore, the MSM estimates are likely to miss individuals who do not meet partners either at MSM-identified venues or MSM-specific Internet sites. FSW estimates are likely to miss individuals who do not find clients at FSW venues.

Data collection

Data collection for geographic mapping proceeded in two phases:

- **Level one:** Meetings were held with local MSM/FSW and other knowledgeable community members in each governorate to develop a list of known gathering places for MSM/FSW ("hotspots") throughout the governorate. The result was a list of all known hotspots and peak times at each hotspot.

- **Level two**: Once the listing had been developed, data collection was conducted at selected hotspots. In some cases, it was not possible to visit all hotspots due to resource limitations. The protocol envisioned employing random selection in these cases to determine which hotspots would be selected for data collection. However, local teams prioritized larger venues. To ensure that this does not lead to an over-estimate, reduction factors, by type of venue, were introduced in the extrapolation phase (see Data Analysis below). Field teams of outreach workers (including at least one KAP member) visited each of the selected hotspots once for 30 to 60 minutes during a peak time. Visits were limited to 30 to 60 minutes due to limited time and resources for data collection. Adjustment factors were introduced to account for individuals who may have been missed during the visit period (see Data Analysis). During each visit, data was gathered by three methods:

  a) **Direct observation** to determine the number of MSM/FSW present at the hotspot during the visit. Field teams identified MSM/FSW based on their appearance and behaviors.
  b) **Structured interviews** with one to four KIs per venue. KIs included KAP and non-KAP members knowledgeable about the KAP community, such as owners, managers and employees of hotspots. Participants were asked to provide an estimate number for MSM/FSW present (to compare with the team's own observation), and venue utilization patterns. KIs were often pre-existing contacts of team members, thus representing a convenience sample.
  c) **A brief, 8-question survey** with a subset of the KAP KIs interviewed, in order to gather more detailed information on patterns of frequenting venues and Internet sites. The face-to-face survey was voluntary and anonymous with no incentive provided. Responses were recorded onto a standard paper questionnaire (see Annex I – MSM Questionnaire and Annex II– FSW Questionnaire).

At levels one and two, governorate-level teams classified the hotspots into the following:

- FS (fixed sex venue—for FSW this would be a brothel; for MSM, a hotel or other location where male sex workers congregate)
- EV (Entertainment venue- Bar, nightclub, spa, massage parlor)
- SV (Social venue- Mall, shopping center, market, food stall, fitness center, mosque)
- OV (Other venue- Café, restaurant, hairdresser)
- SO (Street or outdoor area- street/road, park, train station, bus terminal, harbor area, boardwalk/corniche)

Data collection for virtual mapping (MSM only) comprised two phases:

- **Level one**: In each governorate, a separate meeting was held with MSM knowledgeable about the use of websites and cell phone apps for meeting male partners. Participants developed a list of sites and applications used by MSM. The most common sites across governorates included Hornet, Grindr, Manjam and Badoo.

- **Level two**: Mapping consisted of determining the number of MSM online at a given time in a given governorate. Of the websites mentioned, only Manjam and Badoo provided such a count. Primary data collection was therefore limited to these sites. However, adjustments are described in the *Data Analysis* section to include MSM who use other websites in the size es-

timates, based on responses to the 8-question survey mentioned above. To conduct the virtual mapping, study staff logged onto Manjam and Badoo, respectively,at specific times during daytime hours (between 1pm and 3pm) and evening hours (between 7pm and 10pm). At each login, study staff based in Cairo conducted a search to identify the number of individuals whose profiles described them as males, ages 18 and older, in the respective governorate, who were online at that moment seeking male partners. The count therefore reflects the number of MSM online at a particular moment—the moment the search was conducted. The resulting count of profiles was recorded. There was no interaction with individuals online.

Geographic mapping was conducted during a one to two-week period in each selected governorate during November 2014.

In all the selected governorates, virtual mapping (for MSM only) was conducted by a central team from Cairo. The mapping started with a two-weeks period of day-to-day visits to the sites at random times to ascertain the peak times. Actual user counts were conducted during a second two-week period in December 2014, during both afternoon and evening peak times. These counts took place on five days: the 14th (Sunday), 16th (Tuesday), 18th (Thursday), 20th and 27th (Saturday).

Table 3: Levels of Mapping

Levels of mapping	Geographical Mapping		Virtual mapping	
	Level 1	Level 2	Level 1	Level 2
MSM	✓	✓	✓	✓
FSW	✓	✓		

Data analysis

Data analysis to develop the size estimates began with the observed counts of individuals at venues (and for MSM, on Internet hookup sites) and then applied a series of statistical adjustments to account for:

√ population segments that may have been missed during the mapping exercises
√ Individuals who may have been counted twice (i.e. double counting).

In some cases, these adjustments were derived from KAP members' responses to the 8-question surveys. In other cases, an assumption was needed as data were not available from the survey; field teams were asked to deliberate and reach consensus on adjustment factors based on their perceptions of the population during data collection and their knowledge pertaining to MSM and FSW communities.

The derivation of the estimates is described below.

Geographic mapping:

- **Initial observed count.** The initial count at each hotspot where data were collected was taken to be the highest count reported by the field team and KAP KIs they interviewed at the venue. The highest count was used to compensate for the fact that any one of the counts may have missed KAP members present: field teams felt that they were more likely to have under-estimated than over-estimated KAP number present by basing the count on visual appearances and behaviours. The initial hotspot-level counts were then summed across hotspots by type.
- **Extrapolation to unmapped hotspots.** The initial counts were inflated to represent the hotspots not included in level two data collection. Because NGOs did not select hotspots to visit randomly, but instead visited the largest hotspots, fewer MSM/FSW would be expected at the

unmapped venues. To account for this, we applied an adjustment factor provided by the NGOs for each type of hotspot: the factor represents the average number of MSM the field teams believe would be present at the unmapped hotspots relative to mapped hotspots of the same type. In Cairo, eight MSM entertainment venues (bars/nightclubs) were identified, but none were visited due to their high cost and budget limitations; MSM number at these venues was extrapolated based on two entertainment venues where data were collected in Alexandria.

- **Adjustment for double-counting across hotspots.** MSM/FSW may have been double-counted if they happened to visit two or more of the hotspots when field teams were there. NGOs were asked to estimate what percent of their counts might represent double-counting, again by type of venue. The estimates were then reduced by this percentage.
- **Adjustment for frequency of being present at the hotspots.** Because field teams visited hotspots only once and for a relatively short time (30 to 60 minutes) during a peak period, some MSM/FSW who normally frequent venues may have been missed. This would include: MSM/FSW who were present during the peak period but not when the field team was there; MSM/FSW who were at the venues at off-peak times during the 1-2 week data collection period; These groups were included in the size estimation by applying an assumed inflation factor of 500 per cent for MSM and 300 per cent for FSW. The level of the adjustment was determined by the TWG.
- **Adjustment for police crackdown.** During data collection the ongoing crackdown by police on gay men and other MSM continued and intensified in many of the same governorates where data collection was conducted. The crackdown is widely perceived to have driven MSM even more underground than normal, so that many would have refrained from visiting known hotspots. To account for this, NGOs estimated MSM percentage normally found at venues, who probably would not have visited venues due to the crackdown. The estimates were inflated by this percentage.

Virtual mapping (MSM only):

- **Initial observed count starting from Manjam site.** The number of MSM on Manjam and Badoo sites was recorded at different days and times during a two-week period. The count from Manjam was taken as the initial count because Manjam counts were higher than Badoo counts and no data were available to account for double-counting specifically between Manjam and Badoo. However, in a later step of the analysis, the estimates were extrapolated from Manjam to all sites (including Badoo, Grindr, Hornet and others) as described below.
- **Separation into daytime and evening counts.** The observed counts were recorded at a number of different times. The counts cannot be summed together because of the possibility of double-counting MSM who were online at multiple times. However, using the survey, we can develop an adjustment to account for double-counting between “daytime users” and “evening users”. We therefore took the initial count in each governorate as the maximum of the daytime counts (13:00-15:00) plus the maximum of the evening counts (19:00-22:00).
- **Adjust for double-counting between daytime and evening users.**Using the survey, we estimate the percent of MSM who use Manjam during the daytime who also use Manjam during the evening. This represents our estimate of double-counting of daytime and evening Manjam users. The initial count is reduced by this percentage.
- **Adjust for individuals who have multiple Manjam profiles.** Findings from the NGO survey indicated that some MSM who use Manjam have more than one profile. Some of these individuals may have been double-counted if they were online with different profiles at the same time. From the NGO survey, we estimated the average number of accounts per Manjam user in each governorate. The size estimate is then divided by the average number of accounts.
- **Extrapolate to virtual sites other than Manjam.** We then inflated the size estimate to account for MSM who use virtual sites but who would have been missed by limiting our count to Manjam. From the survey, we calculated the percent of participants who reported typically using websites or cell phone apps to meet male partners and who did not report using Manjam. The estimate is inflated by this percentage.

- **Adjust for frequency of using Manjam.** We inflate the count further to account for the fact that some Manjam users may not have been on Manjam at the specific times when the observed counts were recorded. The inflation factor is the percent of MSM who said they "typically" use Manjam, who said they had not used Manjam in the past 7 days. Although the reference period of this survey question does not match the 2-week data collection period precisely, we take the percentage as an approximation of the share of MSM who use such sites but were not online during data collection.

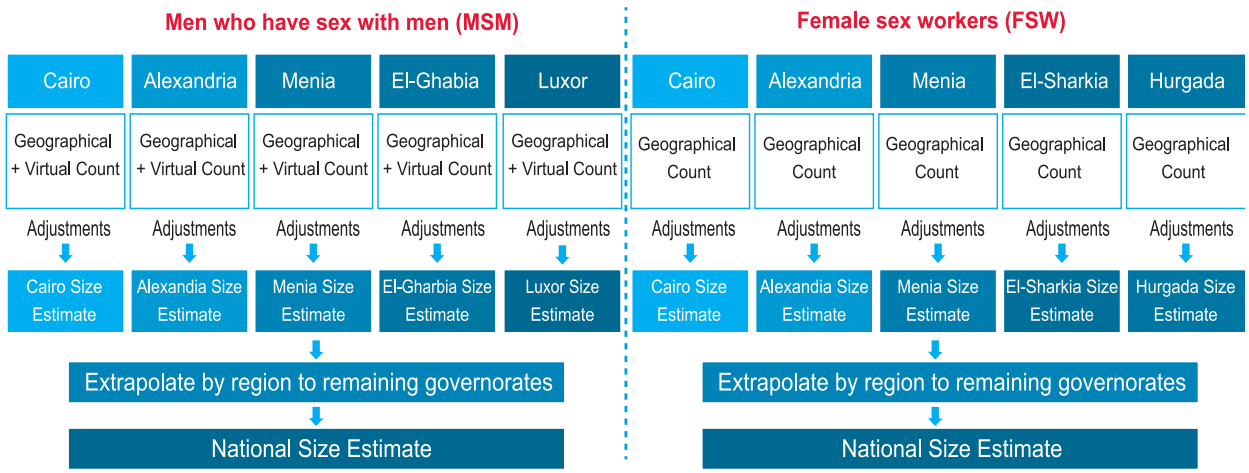
Combining the virtual and geographic estimates (MSM only)

- **Adjust for double-counting between geographic and virtual hotspots.** It is clear from the survey—which was conducted at venues—that many MSM who frequent venues also use the Internet to meet male partners. These MSM may be included in both the geographic mapping estimate and the virtual mapping estimate.To reduce the likelihood of double-counting, prior to combining the two estimates, we reduce the geographic mapping estimate by the percent of survey participants who said they had used virtual sites to meet partners in the past 7 days.

  It is important to note that in Luxor and Garbia, the estimated double-count or "overlap" is greater than the entire virtual count. This is likely due to problems in representativeness or precision in the survey. Given the indication of large overlap, in these two governorates the size estimate is the geographic mapping estimate only and does not take into account the virtual estimate, i.e. it assumes that all those who use internet sites to meet partners also come to physical venues.

Derivation of national estimates:

- **Population percentages.** To obtain the population percentage in each governorate, the estimated number of MSM or FSW was divided by the 2014 census population of males or females respectively in urban areas. The age range of census data for the MSM estimates was ages 18 to 59 years and the age range for FSW was 15 to 49 years old. The urban population was used because data collection was limited to urban areas, however it is noteworthy that residents of rural areas are expected to be among those who frequented mapped venues. This is based on previous experience from current programs and the present study.
- **Extrapolation to unmapped governorates.** To obtain estimates in governorates where mapping was not conducted, the urban census population was multiplied by the population percentage from the mapped governorate in the same region.
- **National estimates.** The national estimates are the result of summing the estimated KAP population across all governorates. The national estimates do not reflect the governorates excluded from the estimation due to safety concerns or resource constraints (see the section on selection of governorates earlier in this section).



Findings-Males Who Have Sex with Men

Geographic mapping

The study identified 186 venues where MSM congregate in Cairo and Giza, 40 in Alexandria, 33 in Menia, 29 in Gharbia and 28 in Luxor. These hotspots were identified both during Level one meetings and during Level two data collection.

Most hotspots were cafés, restaurants or hair salons (type "OV"), followed by streets or outdoor areas such as the coast street (Corniche) and transport terminals (table 4). Out of the ten entertainment venues identified, such as bars, nightclubs, etc, eight were in Cairo. Field teams did not visit these sites. The Data Analysis section describes an adjustment to account for MSM at these sites. One venue where male-to-male sex was known to be sold was identified, in Luxor.

Level two data collection was conducted at all hotspots identified in Luxor, Gharbia and Menia, i.e., in 38 (95 per cent) of 40 hotspots in Alexandria and in 84 (45 per cent) of 186 venues in Cairo.

The total number of MSM observed during these visits (i.e., the "initial counts") was 1287 in Cairo, 1165 in Alexandria, 711 in Gharbia, 384 in Luxor, and 230 in Menia.

The average number of MSM present at a given venue ranged from 4 to 40 MSM across the different types of venues. On average, the largest numbers of MSM were identified at entertainment establishments in Gharbia and Alexandria and at social venues in Alexandria. Overall, Alexandria had the largest average number of MSM and Menia the smallest number of MSM per venue.

PERCENTAGE OF COVERED HOTSPOTS

- **Luxor, Gharbia and Menia: 100%**
- **Alexandria: 95%**
- **Cairo: 45%**

NUMBER OF OBSERVED MSM

- **Cairo: 1287**
- **Alexandria: 1165**
- **Gharbia: 711**
- **Luxor: 384**
- **Menia: 230**

Table 4.Geographic mapping- MSM

Governorate	No. of hotspots identified					Number of hotspots visited					Number of MSM observed					Average MSM per hotspot				
	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO
Cairo-Giza	0	8	4	145	29	0	0	1	67	16	0	0	7	913	367	0	0	7	14	23
Alexandria	0	1	4	23	12	0	1	3	22	12	0	40	114	632	379	0	40	38	29	32
Luxor	1	0	0	20	7	1	0	0	20	7	7	0	0	258	119	7	0	0	13	17
Gharbia	0	1	2	19	7	0	1	2	19	7	0	40	8	336	327	0	40	4	18	47
Menia	0	0	7	16	10	0	0	7	16	10	0	0	37	112	81	0	0	5	7	8

FS- Fixed sex venue
EV- Entertainment venue
SV- Social venue
OV- Other establishment
SO- Street or outdoors venue

Virtual mapping

The number of men aged 18 or older online and seeking male sex partners at a given time was higher during evening hours (19:00 to 22:00) compared to daytime hours (13:15 to 15:30) in all governorates (Table 5). The maximum number of MSM on the Manjam site at a given time ranged from 35 in Menia to 7014 in Cairo during evenings and from 18 in Menia to 463 in Cairo during the daytime observation times. There were fewer MSM on Badoo compared to Manjam in most governorates. However, in Alexandria the Badoo and Manjam counts were similar.

Table 5. Maximum number of MSM on virtual sites at evening and daytime observation times

Governorate	Evenings (19:00-22:00)		Daytime (13:15-15:30)	
	Manjam	Badoo	Manjam	Badoo
Cairo	7014	3507	463	224
Alexandria	1337	1204	173	126
Luxor	73	36	54	18
Gharbia	131	63	49	28
Menia	35	23	18	11

Source: Level 2 virtual mapping

Population size estimates

Table 6 shows how MSM size estimates were derived from the initial geographic and virtual mapping counts.

To illustrate, there were1287 MSM observed in Cairo and Giza, which increased to 1819 after extrapolation to hotspots not included in data collection. This decreased to 1365 after accounting for field teams' estimates of the percentage of MSM who had been present at different hotspots and double-counted. The figure is then increased to 6823 to account for MSM who frequent venues, but were not present during the mapping visits, which were conducted at peak attendance times but lasted only 30 to 60 minutes due to resource limitations; this adjustment factor is assumed to be 500 per cent. Finally, the estimate increases to 11,599 MSM after accounting for the police crackdown. Similarly, the virtual estimate began with 7014 observed MSM on Manjam in the evenings, increased to 7027 to account for daytime users who may not have been online at evening times, increased further to 8014 to account for Manjam users not online at all during the observation period, and to 11,562 after extrapolating to virtual sites other than Manjam. Reducing this figure to account for potential double-counting of MSM who frequent both hotspots and virtual hookup sites, the final size estimate was 15,590 MSM.

POPULATION ESTIMATE IN MAPPED GOVERNORATES (AFTER ADJUSTMENTS)

- **Cairo-Giza: 15590 (0.40%)**
- **Alexandria: 7937 (0.58%)**
- **Gharbia: 1872 (1.52%)**
- **Luxor: 4019 (1.01%)**
- **Menia: 1150 (0.43%)**

The MSM population percentage was calculated by dividing the estimated MSM number by the census population of males aged 18 to 59 years in urban areas in 2014. The census figure used in the calculation was limited to urban areas because the mapping was limited to urban areas. The estimated 15,590 MSM in Cairo and Giza correspond to 0.40 per cent of males aged 18 to 59 years in these governorates in urban areas.

The estimated MSM number varied from 1,150 in Menia to 15,590 in Cairo and Giza. The population percentages varied from 0.43 per cent in Menia to 1.52 per cent in Luxor.

Table 6. Summary of men who have sex with men population size estimates

SUMMARY– MSM	Cairo-Giza	Alexandria	Luxor	Gharbia	Menia
Geographic mapping estimates					
Unadjusted (sum over maximum observed count at each hotspot)	1287	1165	384	711	230
After adjustments:					
Extrapolate to unmapped hotspots	1819	1192	384	711	230
Adjust for mobility between hotspots	1365	1073	288	604	230
Adjust for venue-going MSM not present during data collection	6823	5363	1440	3022	1150
Adjust for police crackdown	11599	7937	1872	4019	1150
Virtual mapping estimates					
Unadjusted (maximum on Manjam at a given time)	7014	1337	73	131	35
After adjustments:					
Counting evening and daytime users separately	7027	1342	75	160	46
Adjust for multiple Manjam accounts	7027	789	75	100	46
Adjust for frequency of using Manjam	8014	900	85	114	52
Extrapolate to excluded virtual sites	11562	999	165	164	75
Geographic + virtual estimates					
Adjusted geographic + adjusted virtual	23161	8936	2037	4183	1225
After adjustment for double-counting between geo & virtual	**15590**	**7937**	**1872**	**4019**	**1150**
Population percentage (of urban males ages 18-59)	**0.40%**	**0.58%**	**1.52%**	**1.01%**	**0.43%**

Sensitivity of the estimates to the adjustment factors

The effect of the adjustments varies by governorate. Table 7 shows how the final results change when excluding the statistical adjustments one by one, holding all else constant.

For example, in Cairo and Giza, the fully adjusted estimate is 0.40 per cent of population in table 6. Table 7 shows that with no adjustments at all, merely summing the unadjusted geographic and virtual counts, the estimate becomes 0.21 per cent. Leaving any single adjustment leads to estimates ranging from 0.30 to 0.46 per cent. When including only the adjustments that increase the estimate, this rises to 0.71 per cent and when including only those that decrease the estimate, the estimate decreases to 0.21 per cent. In other governorates, the range obtained from including only adjustments that decrease the estimate and only those that increase the estimate is 0.09- 0.79 per cent in Alexandria, 0.23- 2.25 per cent in Luxor, 0.15- 1.26 per cent in Gharbia and 0.09- 0.46 per cent in Menia.

In Cairo-Giza, the adjustment that exerts the greatest impact on the estimates is for double-counting between geographic and virtual sites. In Luxor, the largest effect is accounting for those who did not come to the physical venues during the mapping period. The impact of the same adjustments in Gharbia, Menia. and Alexandria were also significant (Table 7.)

The proposed best estimate is the fully adjusted estimate (Table 8). The proposed lower bound is the scenario including all deflation factors and no inflation factors. The proposed upper bound is the scenario with all inflation factors and no deflation factors.

Table 7. Sensitivity analysis for men who have sex with men population size estimates

SENSITIVITY ANALYSIS – MSM	Cairo-Giza	Alexandria	Luxor	Gharbia	Menia
Assuming unmapped geo hotspots have sameaveragesame average number of MSM as mapped geo hotspots (instead of applying the reduction factors provided by NGOs)					
Estimated MSM	17983	8203	1872	4019	1150
Population percentage	**0.46%**	**0.60%**	**1.52%**	**1.01%**	**0.43%**
Excluding adjustment for double-counting between geo venues ("mobility")					
Estimated MSM	16932	8819	2496	4728	1150
Population percentage	**0.43%**	**0.65%**	**2.02%**	**1.19%**	**0.43%**
Excluding adjustment for double-counting between geo & virtual MSM*					
Estimated MSM	11599	--	--	--	--
Population percentage	**0.30%**				
Excluding adjustment for multiple Manjam accounts*					
Estimated MSM	14167	--	--	--	--
Population percentage	**0.36%**				
All inflation factors, no deflation factors					
Estimated MSM	27767	10730	2777	5024	1237
Population percentage	**0.71%**	**0.79%**	**2.25%**	**1.26%**	**0.46%**
All deflation factors, no inflation factors					
Estimated MSM	7488	1159	288	604	230
Population percentage	**0.21%**	**0.09%**	**0.23%**	**0.15%**	**0.09%**
Raw data, no adjustments:					
Estimated MSM	8301	2502	457	842	265
Population percentage	**0.21%**	**0.09%**	**0.23%**	**0.15%**	**0.09%**

*Adjustment for double-counting between geo & virtual MSM and the adjustment for multiple Manjam accounts were not applied to Alexandria, Luxor, Gharbia and Menia due to lack of information indicating these adjustments were necessary.

Table 8. Proposed best estimate and range for men who have sex with men population size estimates

Governorate	Best Estimate		Lower Bound (all deflation factors, no inflation factors)		Upper Bound (all deflation factors, no inflation factors)	
	No	%	No	%	No	%
Cairo-Giza	15590	0.40	7488	0.19	27767	0.71
Alexandria	7939	0.58	1159	0.09	10730	0.79
Luxor	1782	1.52	288	0.23	2777	2.25
Gharbia	4019	1.01	604	0.15	5024	1.26
Menia	1150	0.43	230	0.09	1237	0.46

National estimates

Estimates for governorates where data collection was not conducted were obtained by multiplying the population percentage estimates to the urban census population of the respective governorate (Table 9).

Summing the size estimates over all governorates included in the analysis leads to the national estimate of 64,318 MSM and an uncertainty range of 15,946-90,914 MSM. These figures are equivalent to 0.62% (0.15%-0.87%) of males ages 18-59 years in urban areas.

The national estimate does not reflect Red Sea, New Valley, North and South Sinai governorates, which were excluded due to resource constraints and security concerns as described in the section on methods.

NATIONAL ESTIMATE OF MSM AMONG MALES AGED 18-59:
64,318 (15,946 - 90,914).
This is equivalent to:
0.62% (0.15%-0,87%)

Table 9. Governorate and national size estimates for men who have sex with men

	Urban Males ages 18-59 (census)	Estimated MSM	Lower bound	Upper bound
Greater Cairo				
Cairo and Giza (mapped)	3,925,747	15,590	7,488	27,767
Qalyoubia	651,280	2,586	1,242	4,607
Northern Coast				
Alexandria (mapped)	1,362,802	7,937	1,159	10,730
Matrouh	87,455	509	74	689
Upper Egypt, touristic				
Luxor (mapped)	123,427	1,872	288	2,777
Aswan	172,032	2,609	401	3,871
Upper Egypt, other				
Menia (mapped)	269,546	1,150	230	1,237
Assiut	316,269	1,349	270	1,452
Beni Souef	182,700	779	156	839
Fayoum	199,944	853	171	918
Qena	167,811	716	143	770
Souhag	274,797	1,172	234	1,261
Delta and Suez Canal				
Delta				
Gharbia (mapped)	398,285	4,019	604	5,024
Behira	310,232	3,130	470	3,914
Daqahlia	469,699	4,740	713	5,925
Damieta	147,206	1,485	223	1,857
Kafr Elsheikh	203,093	2,049	308	2,562
Monoufia	228,328	2,304	346	2,880
Sharqia	424,033	4,279	643	5,349
Suez				
Ismailia	146,752	1,481	223	1,851
Portsaid	191,399	1,931	290	2,414
Suez	175,986	1,776	267	2,220
NATIONAL TOTAL	10,428,823	**64,318**	**15,946**	**90,914**
Population percentage	-	**0.62%**	**0.15%**	**0.87%**

FINDINGS - Female Sex Workers

Geographic mapping

The study identified 234 venues where FSW congregate in Cairo and Giza, 150 in Alexandria, 86 in Red Sea, 40 in Menia and 35 in Sharkia. Hotspots were identified during Level 1 meetings and during Level 2 data collection.

Most hotspots were cafés, restaurants or hair salons (type "OV"), similar to the MSM mapping .(Table 10) However, more entertainment venues such as bars and nightclubs were identified for FSW: 55 in Cairo-Giza, 15 in Alexandria and 28 in Red Sea. There were fewer street and outdoor FSW locations and only one social venue (e.g., mall, shopping center, market, food stall, fitness center or mosque) was identified, in Menia.

Level one meetings suggested a large FSW number who sold sex out of private residences, such as apartments. However, field teams did not carry out data collection at these locations and were unable to determine the number of FSW working there due to security concerns. Figures presented in this report do not reflect apartment-based FSW.

Field teams conducted data collection at 103 (44 per cent) of 234 hotspots in Cairo and Giza, 70 (47 per cent) of 150 hotspots in Alexandria, 29 (83 per cent) of 35 in Sharkia, 62 (72 per cent) of 86 in Red Sea and 37 (93 per cent) of 40 in Menia. As mentioned in the Methods section, it was not possible to conduct data collection at all hotspots due to resource limitations

The total number of FSW observed during these visits was 1759 in Cairo and Giza, 1555 in Alexandria,472 in Sharkia, 425 in Red Sea, and 103 in Menia.

The average number of FSW present at a given venue ranged from 10 to 58 FSW across the different types of venues. On average, street and outdoor locations had the largest average number of FSW in Cairo and Giza, Alexandria and Sharkia, followed by cafes, restaurants and hair salons ("other venues"). These venues tended to be smaller in Red Sea and Menia, where from two to seven FSW were observed per venue visit. In Cairo, Giza and Alexandria, there were fewer FSW observed at entertainment venues, compared to streets and other locations.

PERCENTAGE OF COVERED HOTSPOTS

- **Menia: 93%**
- **Sharkia: 83%**
- **Red Sea: 72%**
- **Alexandria: 47%**
- **Cairo and Giza: 44%**

NUMBER OF OBSERVED MSM

- **Cairo and Giza: 1759**
- **Alexandria: 1555**
- **Sharkia: 472**
- **Red Sea: 425**
- **Menia: 103**

Table 10. Geographic mapping – Female Sex Workers

Governorate	No. of hotspots identified					Number of hotspots visited					Number of FSW observed					Average FSW per hotspot				
	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO	FS	EV	SV	OV	SO
Cairo-Giza	0	55	0	170	9	0	15	0	85	3	0	156	02	1428	175	0	10.4	0	17	58
Alexandria	0	15	0	123	12	0	2	0	59	9	0	8	0	1374	173	0	4	0	23	19
Sharkia	0	0	0	34	1	0	0	0	28	1	0	0	0	442	30	0	0	0	16	30
Red Sea	0	28	0	56	2	0	24	0	36	2	0	153	0	259	13	0	6.4	0	7	7
Menia	0	0	1	33	6	0	0	1	31	5	0	0	6	75	22	0	0	6	2	4

FS- Fixed sex venue
EV- Entertainment venue
SV- Social venue
OV- Other establishment
SO- Street or outdoors venue

Population size estimates

Table 11 shows how the size estimate evolved at each step of the analysis, from the initial ("unadjusted") counts to the fully adjusted estimates.

For example, there were an observed 1759 FSW during mapping at venues in Cairo and Giza. This figure increased to 2538 after extrapolating to hotspots where data collection was not conducted. After accounting for possible double-counting among hotspots, the figure decreased to 2031 FSW. The figure is then adjusted upward to 6092 account for FSW who typically present to venues, but were not present during the mapping visits, which were conducted at peak attendance times but lasted only 30 to 60 minutes due to resource limitations; this factor is assumed to be 300 per cent.

The FSW population percentage was calculated by dividing FSW estimated number by the census population of females aged 15 to 49 years in urban areas in 2014. As in MSM analysis, the census figure was limited to urban areas because mapping was conducted in urban areas. The estimated 6,092 FSW is equivalent to 0.17 per cent of all females aged 15 to 49 years in Cairo and Giza governorates in urban areas.

FSW estimated number varied from 278 in Menia to 6,092 in Cairo and Giza. The population percentages varied from 0.11 per cent in Menia to 1.92 per cent in Red Sea, which is widely regarded as an important centre of female sex work in the country

.Table 11. Summary of Female Sex Worker population size estimates

SUMMARY– FSW	Cairo-Giza	Alexandria	Sharkia	Red Sea	Menia
Geographic mapping estimates					
Unadjusted (sum over maximum observed count at each hotspot)	1759	1555	472	425	103
After adjustments:					
Extrapolate to unmapped hotspots	2538	2167	472	461	108
Adjust for mobility between hotspots	2031	1408	448	438	93
Adjust for venue-going FSW missed during data collection	6092	4225	1345	1315	278
Population percentage (of urban females ages 15-49)	**0.17%**	**0.34%**	**0.34%**	**1.92%**	**0.11%**

Sensitivity of the estimates to the adjustment factors

Table 12 shows how the final results change when excluding each of the adjustments, holding all else constant.

For example, in Cairo and Giza, the fully adjusted estimate is 0.17 per cent of the population in table 11. With no adjustments at all, merely taking the initial (observed) counts, the estimate is 0.05 per cent. When including only the adjustments that increase the estimate (extrapolation to unmapped hotspots assuming the same average FSW number as were observed in the mapped hotspots and the frequency adjustment to account for FSW not present during the mapping visits), leads to an estimate of 0.21 per cent.

The proposed best estimate is the fully adjusted estimate (table 13). The proposed lower bound is obtained by including only those adjustments that decrease the estimate. The proposed upper bound is obtained by including only adjustments that increase the estimate. The range, in terms of the population percentage, was 0.08- 0.52 per cent in Alexandria, 0.1-0.36 per cent in Sharkia, 0.59- 2.02 per cent in Red Sea and 0.04- 0.13 per cent in Menia).

Table 12. Sensitivity analysis for female sex worker population size estimates

SENSITIVITY ANALYSIS– FSW	Cairo-Giza	Alexandria	Sharkia	Red Sea	Menia
Assuming unmapped geo hotspots have same number of FSW as mapped geo hotspots					
Estimated FSW	8647	6040	1345	1694	290
Population percentage	**0.24%**	**0.48%**	**0.34%**	**2.47%**	**0.11%**
All inflation factors, no deflation factors					
Estimated FSW	7615	6500	1416	1384	323
Population percentage	**0.21%**	**0.52%**	**0.36%**	**2.02%**	**0.13%**
All deflation factors, no inflation factors					
Estimated FSW	1407	1011	448	404	89
Population percentage	**0.04%**	**0.08%**	**0.11%**	**0.59%**	**0.04%**
SENSITIVITY ANALYSIS– FSW	**Cairo-Giza**	**Alexandria**	**Sharkia**	**Red Sea**	**Menia**
Raw data, no adjustments:					
Estimated FSW	1759	1555	472	425	103
Population percentage	**0.05%**	**0.12%**	**0.12%**	**0.62%**	**0.04%**

* All inflation factors include extrapolation to unmapped hotspots and for purposes of extrapolation assumes the same average number of FSW as were observed in the mapped hotspots. Deflation factors include the mobility adjustment only.

The proposed best estimate is the fully adjusted estimate (Table **13**). The proposed lower bound is obtained by including only those adjustments that decrease the estimate. The proposed upper bound is obtained by including only adjustments that increase the estimate. The range, in terms of the population percentage, was 0.08%-0.52% in Alexandria, 0.11%-0.36% in Sharkia, 0.59%-2.02% in Red Sea and 00.04%-0.13% in Menia).

Table 13. Proposed best estimate and range for female sex worker population size estimates

Governorate	Best Estimate		Lower Bound (all deflation factors, no inflation factors)		Upper Bound (all deflation factors, no inflation factors)	
	No	%	No	%	No	%
Cairo-Giza	6092	0.17	1407	0.04	7615	0.21
Alexandria	4225	0.34	1011	0.08	6500	0.52
Sharkia	1345	0.34	448	0.11	1416	0.36
Red Sea	1315	1.92	404	0.59	1384	2.02
Menia	278	0.11	89	0.04	323	0.13

National estimates

The national estimates and estimates for unmapped governorates appear in table 14. The national estimate is 22,986 (6,460-26,792) FSW, equivalent to 0.24 per cent (0.07-0.28 per cent) of females aged 15 to 49 living in urban areas.

The FSW estimates do not reflect Luxor, Aswan, New Valley, North and South Sinai, due to limited resources and security concerns, as described in the Methods section.

NATIONAL ESTIMATE OF FSW AMONG FEMALES AGED 15-49 LIVING IN URBAN AREAS:
22,986 (6,460-26,792).
This is equivalent to:
0.24% (0.07%-0.28%) of urban areas.

Table 14. Governorate and national size estimates for FSW

	Urban females ages 15-49 (census)	Estimated FSW	Lower bound	Upper bound
Greater Cairo				
Cairo and Giza (mapped)	3,617,666	6,092	1,407	7,615
Qalyoubia	595,017	1,002	231	1,252
Northern Coast				
Alexandria (mapped)	1,251,070	4,225	1,011	6,500
Matrouh	74,424	251	60	387
Upper Egypt, other				
Menia (mapped)	252,686	278	89	323
Assiut	288,130	317	101	368
Beni Souef	171,807	189	60	220
Fayoum	181,855	200	64	232
Qena	157,135	173	55	201
Souhag	253,840	279	89	324
Delta and Suez Canal				
Delta				
Sharqia (mapped)	390,827	1,345	448	1,416
Behira	287,595	990	330	1,042
Daqahlia	441,890	1,521	507	1,601
Damieta	134,518	463	154	487
Gharbia	378,317	1,302	434	1,371
Kafr Elsheikh	194,610	670	223	705
Monoufia	211,406	728	243	766
Suez				
Ismailia	139,572	480	160	506
Portsaid	176,681	608	203	640
Suez	162,350	559	186	588
Red Sea	68,446	1,315	404	248
National total	9,429,842	**22,986**	**6,460**	**26,792**
Population percentage	-	**0.24**	**0.07**	**0.28**

PEOPLE WHO INJECT DRUGS

Methods

Overview

As is the case for MSM and FSW, geographic mapping has been used in many countries in South Asia and Southeast Asia to estimate the size of PWID populations.[6] Due to security concerns, a more limited form of geographic mapping (Level 1 only—see below) was conducted to develop the size estimates for male PWID. The mapping was based on data supplied by key informants and did not include field visits to known hotspots.

Level one geographic mapping for male PWID consisted of two to three meetings in each governorate. Participants included:

- In Cairo, former PWID and outreach workers (14 participants)
- In Alexandria: former PWID, drug treatment centre staff and KIs (22 participants)
- In Menia, former PWID, community activists and faith-based services (21 participants)

During Level one meetings, recovering PWID, KIs, outreach workers and other knowledgeable community members in Menia, Alexandria and Cairo developed lists of hotspots where they believed drugs that are commonly injected are sold (and injected). Meeting participants were then asked to estimate the number of male PWID present at peak times at each hotspot. However, the participants provided different types of data, based on aspects of the drug trade they knew best. For example, in Alexandria the primary KIs provided estimates of volume of sales at each hotspot, while in Cairo and Menia participants provided a number of estimated PWID at each hotspot. Annex III shows the data collection tool used in Level one meetings. For example, in Alexandria the primary key informants provided estimates of volume of sales at each hotspot, while in Cairo and Menia participants they provided a number of estimated PWID at each hotspot. Annex III shows the data collection tool used in Level 1 meetings.

Analysis strategy

The analysis to arrive at a size estimate from the data provided varies by governorate due to differences in the kinds of data provided, and due to differences in the way that NGOs in each governorate thought about the potential for double-counting. The analysis is described in greater detail below for each governorate.

Region	Analysis
Cairo & Giza PWID *Data* The counts recorded at the Level one meetings represent numbers of PWID thought to be present at each hotspot daily. The meetings identified 199 hotspots across 37 regions, covering Cairo and Giza governorates. The field team felt that 25 per cent of the male PWID were probably double-counted at hotspots within each region, and 10 per cent were probably double-counted between the regions.	• Counts of male PWID were summed across all hotspots • The total count was reduced by 35 per cent to reflect double-counting • Sensitivity analysis was conducted setting the double-counting factor at 15 per cent, 35 per cent and 55 per cent, respectively

[6] Dongbao Yu, Jesus Maria Garcia Calleja, Jinkou Zhao, Amala Reddy, Nicole Seguy, on behalf of the participants of the Technical Consultation on Lessons Learnt from Size Estimation among Key Populations in Asian Countries. "Estimating the size of key populations at higher risk of HIV infection: a summary of experiences and lessons presented during a technical meeting on size estimation among key populaionts in Asian countries" in Western Pac Surveill Response J. (World Health Organization, 2014 Sep 30) availabe from http://www.ncbi.nlm.nih.gov/pubmed/25320676

Region	Analysis

Alexandria PWID
 	
Data
Meeting in Alexandria identified 182 hotspots. Of these, 174 hotspots were identified at meeting led by Caritas Alexandria, with estimates provided exclusively in terms of volume of daily drug sales (number of "doses"). At a second set of meetings led by YAPD, participants listed 39 hotspots, data for which was provided in terms of doses sold each day for some hotspots and in terms of number of male PWID presenting to the hotspot each day for other hotspots. In addition, 31 of the total hotspots were mentioned both by Caritas and YAPD.
 	
The Alexandria field team felt that, on average, three doses are purchased for each individual PWID. In the absence of other data, the purchased doses were assumed to be used by male PWID.
 	
Furthermore, the field team discussed the potential for double-counting of doses by accounting for overlap between the "Rarely frequented spots by male PWID" and the "Commonly frequented spots by male PWID".
	• Convert all estimates to number of doses by multiplying those that were in PWID terms by three;
	• For hotspots where two sets of estimates were available, one from the Caritas Alexandria meeting and another from the Caritas YAPD meeting, an average was taken across the estimates. The average was taken for the point estimate as well as the range (i.e. average of the lower limit of the range and average of the upper limit);
	• The number of doses was then summed across hotspots by type: Rarely frequented spots by male PWID and Commonly frequented spots by male PWID;
	• The sums by type of hotspots were then converted from number of doses to number of male PWID by dividing by three;
	• The final estimate was calculated as 1 per cent of the rarely frequented total plus 100 per cent of the commonly frequented total; and
	• Sensitivity analysis was conducted for the following scenarios:
	  o Assuming two, three and four doses per PWID;
	  o Assuming that 0.5 per cent, 1 per cent and 5 per cent for rarely frequented

Menia PWID *Data* Counts at each hotspot represent the number of male PWID who visit the hotspot daily, to either inject or buy drugs. Level 1 meetings identified 16 PWID hotspots in Menia. The field team of outreach workers acknowledged potential for double-counting between the Bani Mazaar region—the center of drug trafficking in Menia—and other regions. They believe about 25% of the counts provided for Bani Mazaar hotspots reflects male PWID already reflected in the counts provided for the other areas. The field team did not feel that there was any double-counting ***within*** each of these two regions.	• Counts of male PWID were summed within Bani Mazaar hotspots and "other" hotspots • The Bani Mazaar count was reduced by the 25% double-counting factor • The reduced Bani Mazaar count was added to the count from "other" hotspots • Sensitivity analysis was conducted to determine how the final size estimate changes if the double-counting factor is assumed to be 10%, 25% and 40%, respectively.

Findings- People Who Inject Drugs

Level one geographic mapping

Meetings with local experts in Cairo and Giza identified a total of 199 locations where male PWID are known to buy or inject drugs. Based on participants' estimates of the number of male PWID that frequent each hotspot at peak times on a given day, the average number of male PWID per hotspot was 175 and ranged from 20 to 600 PWID.

Meetings in Menia identified a total of 16 hotspots, seven of which were in the Bani Mazar area and ten in other areas. Data provided led to an average of 71 male PWID per hotspot at Bani Mazar sites and 63 male PWID at other sites. Overall, the range was 30 to 150 male PWID per hotspot.

In Alexandria, participants identified 71 hotspots, these included 55 commonly frequented 55 commonly frequented and 16 rarely frequented hotspots.

Population size estimates

Table **15** shows how the size estimate evolved at each step of the analysis, from the figures reported at Level 1 meetings to the adjusted estimates, after accounting for local experts' perceptions of the extent of potential double-counting or overlap across the hotspots identified. The ranges ("Min", "Max") are based on the lower and upper bounds provided by meeting participants for the hotspots.

The estimated number of male PWID was 22701 (range 21555-44424) in Cairo and Giza, 6969 (6376-7396) in Alexandria and 1005 (910-1116) in Menia. These are equivalent to 0.58% of males ages 18 to 59 in urban areas in Cairo and Giza, 0.51% in Alexandria and 0.37% in Menia.

Table 15. Summary of Male People Who Inject Drug Population Size Estimates

SUMMARY PWID Estimates			
	Estimate	Min	Max
Cairo-Giza			
Raw data, unadjusted	34925	33161	68345
Adjusted for 35% overlap within and between regions	22701	21555	44424
Population percentage	**0.58%**	**0.55%**	**1.13%**
Alexandria			
Raw data, unadjusted	21012	19051	22335
Adjusted for 35% overlap within and between regions	6969	6376	7396
Population percentage	**0.51%**	**0.47%**	**0.54%**
Menia			
Raw data, unadjusted	1130	1025	1255
Adjusted for 25% overlap between Bany Mazar and other regions	1005	910	1116
Population percentage	**0.37%**	**0.34%**	**0.41%**

Sensitivity of the estimates to the adjustment factors

Table 16 shows how the final results change based on assumptions of the percent of double-counting across hotspots and other key inputs to the calculation.

In Cairo and Giza, varying the presumed level of overlap across regions from 15% to 55% leads to population percentages from 0.40% to 0.76%. No adjustment for overlap results in 0.89%. In Menia, the double-counting adjustment has less effect, leading to estimates between 0.35% and 0.40% of the male population.

In Alexandria, the assumed number of doses per PWID has a greater impact on the findings: varying this from 2 to 4 leads to population percentages from 0.40% to 0.73%. In contrast, varying the percent of those who go to rarely frequented hotspots had a more modest impact, leading to a range from 0.51% to 0.54%. With no adjustments—summing doses across types of hotspots and assuming 1 PWID per dose—increases the estimate threefold from 0.51% to 1.54%.

Table 16. Sensitivity analysis for male People Who Inject Drug population size estimates

SENSITIVITY ANALYSIS - PWID	Estimate	Min	Max
Cairo-Giza			
Raw data, unadjusted			
Estimate	34925	33161	68345
Population percentage	**0.89%**	**0.84%**	**1.74%**
Assuming overlap within and between regions of 15%			
Estimate	29686	28187	58093
Population percentage	**0.76%**	**0.72%**	**1.48%**
Assuming overlap within and between regions of 55%			
Estimate	15716	14922	30755
Population percentage	**0.40%**	**0.38%**	**0.78%**
Alexandria			
Raw data (in doses) , unadjusted			
Estimate (assuming one dose per PWID per day)	21012	19051	22335
Population percentage	**1.54%**	**1.40%**	**1.64%**
Assuming conversion factor of 2 doses per PWID			
Estimate	10024	9182	10665
Population percentage	**0.74%**	**0.67%**	**0.78%**
Assuming conversion factor of 4 doses per PWID			
Estimate	5442	4972	5762
Population percentage	**0.40%**	**0.36%**	**0.42%**
Assuming 0.5% PWID go to rarely frequented hotspots			
Estimate	6920	6332	7344
Population percentage	**0.51%**	**0.46%**	**0.54%**
Assuming 5% % PWID go to rarely frequented hotspots			
Estimate	7361	6728	7818
Population percentage	**0.54%**	**0.49%**	**0.57%**
Menia			
Raw data, unadjusted			
Estimate	1130	1025	1255
Population percentage	**0.42%**	**0.38%**	**0.47%**

SENSITIVITY ANALYSIS - PWID	Estimate	Min	Max
Estimate	1080	979	1200
Population percentage	**0.40%**	**0.36%**	**0.45%**
Assuming 40% overlap between Bani Mazar and other areas			
Estimate	930	841	1033
Population percentage	**0.35%**	**0.31%**	**0.38%**

The proposed best estimate and uncertainty range is presented in Table 17, with the figures taken from the low and high scenarios described above.

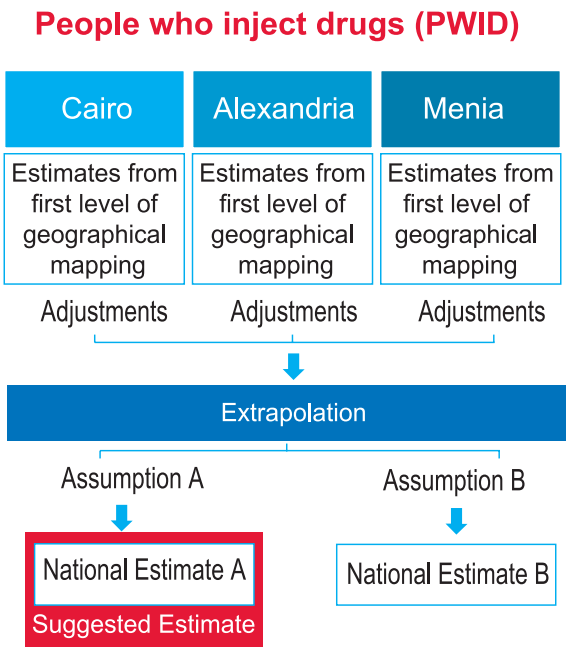
Table 17. Proposed best estimate and range for male PWID population size estimates

Governorate	Best Estimate		Lower Bound (all deflation factors, no inflation factors)		Upper Bound (all deflation factors, no inflation factors)	
	No	%	No	%	No	%
Cairo-Giza	22701	0.58	15716	0.40	29868	0.76
Alexandria	6969	0.51	5442	0.40	10024	0.74
Menia	1005	0.37	930	0.35	1080	0.40

National estimates

National estimates for male PWID were calculated using the very limited data collected through this exercise. For this reason, it is important to recognize the greater uncertainty surrounding the national male PWID estimates in this report compared to similar estimates for MSM and FSW. This is primarily due to the inability to physically visit identified hotspots and the likely differences with respect to presence of male PWID between the three governorates where Level 1 mapping was conducted and the remaining urban areas in the country.

For extrapolation to the national level, two different sets of assumptions were used. Assumption A applied the median urban population percentage of male PWID across the three mapped governorates (0.51 per cent) to the remaining urban adult male population (ages 18-59). Assumption B posited that the situation for PWID in the remaining urban areas would be more similar to Menia than to Cairo/Giza or Alexandria, so the population percentage of male PWID in that governorate (0.37 per cent) was applied to other urban areas in the country. To calculate the upper and lower bounds, the same approach was used, i.e. applying the median low and high population percentages across the three governorates for Assumption A, and using the low and high population percentage for Menia for Assumption B.



Although national estimates inclusive of the rural population were not calculated for MSM and FSW, an extrapolation to rural areas was done for male PWID to come up with an overall national male PWID estimate. Rural population percentages of male PWID were approximated to be half that of the remaining urban areas. Table 18 shows these results and provides lower and upper bounds for the two sets of assumptions.

NATIONAL ESTIMATE (BASED ON ASSUMPTION A) FOR MALE PWID AGED 18-59 IN BOTH RURAL AND URBAN AREAS:

93,314 (86,142 - 119,412).
This equivalent to a percentage: 0.37% (0.35% - 0.48%)

Without additional information to determine if the concentration of male PWID in other urban areas compared to mapped areas, the best estimate recommended uses the median population percentage from the mapped governorates (Assumption A). This national figure comes out to 93,314 male PWID (range: 86,142- 119,412) across both urban and rural areas. As a percentage, this comprises 0.37 per cent (range: 0.35- 0.48 per cent) of the male population aged 18-59.

Table 18. National size estimates for male PWID

	Urban males ages 18-59 (census)	Estimated male PWID	Lower bound	Upper bound	Population percentage of PWID	Lower bound	Upper bound
Mapped Areas:							
Cairo and Giza	3,925,747	22,701	21,555	44,424	0.58%	0.55%	1.13%
Alexandria	1,362,802	6,969	6,376	7,396	0.51%	0.47%	0.54%
Menia	269,546	1,005	910	1,116	0.37%	0.34%	0.41%
Remaining urban areas							
A) *Assume median population percentage of 3 mapped areas*	5,120,232	26,185	23,954	27,789	0.51%	0.47%	0.54%
B) Assume Menia population percentage	5,120,232	18,945	17,286	21,204	0.37%	0.34%	0.41%
National urban PWID							
Assumption A	**10,678,327**	**56,860**	**52,794**	**80,725**	**0.53%**	**0.49%**	**0.76%**
Assumption B	**10,678,327**	**49,620**	**46,126**	**74,141**	**0.46%**	**0.43%**	**0.69%**
Rural Areas	**Rural males ages 18-59**						
Assumption A	14,256,700	36,454	33,348	38,687	0.26%	0.23%	0.27%
Assumption B	14,256,700	26,375	24,066	29,520	0.19%	0.17%	0.21%
Best estimate - Total National	**Males ages 18-59**						
Assumption A	**24,935,027**	**93,314**	**86,142**	**119,412**	**0.37%**	**0.35%**	**0.48%**
Assumption B	**24,935,027**	**75,995**	**70,192**	**103,661**	**0.30%**	**0.28%**	**0.42%**

STRENGTHS AND LIMITATIONS

There are several important strengths and limitations to the study that must be considered when interpreting the population size estimates presented in this report.

First, as is true for all PSE exercises, the definitions of the key populations included in the estimates were limited to specific sub-groups and cannot encompass the full diversity within the community. For example, the MSM represented by this PSE are those in urban areas of Egypt who meet partners at physical venues or through popular online sites catering to MSM. MSM who meet their partners exclusively through private social networks or who socialize exclusively in rural/peri-urban areas are not included. Among FSW, only those who meet clients at physical venues in urban areas are included in the PSE. Those who solicit clients exclusively through brokers, by telephone, or internet or who operate in rural/peri-urban areas are not included. The estimates for PWID in Cairo-Giza and Menia represent those who can be found in physical venues where PWID inject or buy drugs in urban areas. In Alexandria, the PSE represent PWID who buy drugs in physical venues of urban areas in the city. The national estimate of PWID includes both urban and rural PWID who frequent physical venues to obtain drugs or inject.

Population definitions also encompass an element of time. All the PSE pertain to the current number of such key populations. These numbers do not reflect the phenomenon of turnover, in which individuals join and leave the population on an ongoing basis, such that the total number of individuals who may benefit from HIV-related services over the course of a year, exceeds the number that can be reached at any point in time. Data to approximate turnover were not available to this study. Ideally, turnover adjustments are based on data specific to local areas (i.e. governorates) as the dynamics of a specific key population may vary greatly depending on local context.

A second set of limitations relates to natural constraints of mapping-based methods and difficulty validating the data available to make adjustments compensating for these constraints. More specifically, mapping-based methods are used to estimate the size of people coming to physical venues. Time and resource constraints often limit the amount of time field teams can spend observing and interviewing KIs at physical venues. Meanwhile, security and ethical concerns put limits on how much information can be obtained from key population and KIs at venues.

The key strengths of this PSE exercise lies in the effort to document the method and analytical approach, including key adjustments in a clear and transparent fashion. The intent is to provide estimates which can be applied appropriately to improve planning and target setting for key population interventions. For FSW and MSM, the need for multiple types of adjustments were identified: i.e. related to double counting, frequency of coming to venues, and fear of police crackdowns. For PWID, the inability to visit physical hotspots to validate data obtained with KIs that was gathered during Level one mapping puts even greater limitations on the results.

Innovative approaches in applying mapping to virtual venues and applying correction factors to adjust for use of multiple internet sites, multiple user profiles for the same site, time of day at the virtual venue, and the overlap between those who come to physical venues and those who use virtual sites to meet partners represent important advances in the methods used. However, these approaches are nascent and require further development to produce more robust results.

Data used to make a number of adjustments were largely based on the expert opinion (including those of TWG members) and those of key informants interviewed in the field. However, this information is difficult to validate. Many of these adjustments were large (e.g. 500 per cent inflation factor),

and introduce a degree of uncertainty that is difficult to fully assess. Nonetheless, efforts were made to present the adjustments explicitly and to show the impact of applying some but not all adjustments in sensitivity analysis.

We believe these efforts, lacking in many studies on PSE of key populations regionally and globally, support the appropriate use of the size estimates for epidemic modeling and programmatic purposes. In particular, we advocate that approaches for estimating the size of the virtual population and conducting sensitivity analysis with data-driven adjustments should become a standard component of PSE exercises.

This PSE exercise has also illustrated the added benefits of using mapping-based methods for planning key population programmes. Beyond the updated PSE data, this study provides important data, quantitatively describing sub-groups of key populations, which can guide how services are delivered and targeted For example, the different types and relative sizes of physical venues identified for MSM and FSW can guide prevention services in terms of how many outreach workers may be needed and the efficiency of conducting outreach in different types of venues. The relative large proportion of MSM who exclusively use the internet to meet partners in Cairo-Giza underscores the importance of developing strategies that tap into virtual networks rather than relying only on outreach to physical venues. For other countries with nascent key population interventions, the additional benefits of mapping-based approaches are important to consider when making decisions about which methods to apply.

CONCLUSIONS

This study conducted mapping-based size estimates in strategic locations throughout Egypt in order to develop local and national estimates of the number of urban MSM and FSW in the country. To overcome limitations common to mapping data—such as potential double-counting and the limited time available for enumerating individuals present at venues—several adjustments were applied to the estimates based on data collected from the community and local experts with experience working with key populations. Selected governorate-level estimates for PWID were developed through extensive consultation with local experts, including outreach workers, community activists, former injection drug users, and numerous key informants. While based on more limited data collected, governorate level estimates for three areas and a national estimate for male PWID (inclusive of both rural and urban areas) were calculated.

We estimated a total of 64,000 MSM (range: 16,000- 91,000) and 23,000 FSW (range: 6,500- 27,000) in urban areas of Egypt, representing 0.62 per cent (range: 0.15 - 0.87 per cent) and 0.24 per cent (range: 0.07 - 0.28 per cent) of the urban household population of adult males aged 18 to 59 and females aged 15 to 49, respectively. These estimates reflect the part of the population that frequents known MSM and FSW venues in urban areas. In addition, MSM estimates also represent urban MSM who find sex partners using MSM-specific Internet websites or cell phone applications. In all the governorates mapped, MSM who used virtual venues to meet partners comprised a substantial part of this MSM population.

The estimates incorporated a number of adjustments to improve the degree to which they approximate the target populations:

- Extrapolation from venues where mapping was conducted to other known hotspots, stratified by type of venue to improve accuracy
- Adjustment for potential double-counting across hotspots
- Adjustment to account for venue-going MSM/FSW who may not have been present during the field teams' mapping visits
- Extrapolation from Internet sites where mapping was conducted to other Internet sites that could not be mapped (MSM only)
- Adjustment for potential double-counting between geographic hotspots and Internet sites (MSM only)
- Adjustment for the dampening effect of the recent police crackdown on venue attendance (MSM only)

Sensitivity analysis was also conducted to characterize the relative impact of each of the adjustments. Uncertainty ranges were constructed to reflect how the estimates would vary when including only the"inflation" adjustments or only the "deflation" adjustments, respectively. While they are not statistical confidence intervals, the uncertainty ranges convey a sense of potential variation due to uncertainties in the data available for analysis.

Certain segments of the MSM and FSW populations are not represented in the estimates.[7] These include:

- MSM and FSW in the Sinai governorates, where mapping was not conducted due to security concerns
- MSM in New Valley and Red Sea governorates, due to limited resources for data collection

[7] The governorates excluded from the estimates were considered too different from the areas where data were collected to apply a similar method of extrapolation. The populations represented by these areas —2% and 4% of the total male and female household population, respectively, are small and including these governorates would probably not substantially alter the national estimates.

- FSW in New Valley, Luxor, Aswan governorates, due to limited resources for data collection
- FSW who sell sex exclusively out of private residences or by phone or Internet
- MSM who do not meet partners either at MSM-identified venues or MSM-specific Internet sites; for example, those who meet partners exclusively through their social circles
- MSM and FSW operating exclusively in rural areas;

Of the groups not explicitly captured by these estimates, apartment-based FSW appear to be the most important omission. Outreach workers who participated in the mapping field teams suggested that FSW who work out of apartments may represent a substantial proportion of all FSW in some areas. Despite this perception, apartment-based FSW are currently out of reach to programs and no data are available to characterize their size or level of HIV/STI risk. They represent an important segment of the FSW population for prevention and size estimation in the future. Internet-based sex work in Egypt also appears to be more hidden than it often is in other settings. Recommendations on these points are offered in the subsequent section.

Although this study focused on MSM and FSW in urban areas, local experts and stakeholders believe that key populations residing in rural areas may come to urban areas to engage in risk behaviors and these individuals would be included in the estimates presented here. Only those key populations who rarely or never come to urban areas to meet sex partners or inject drugs would be excluded. Those operating exclusively in rural areas would also be outside of catchment areas where prevention interventions offer services (as currently planned).

As for PWID, this study presents a best national level estimate of 93,314 male PWID (range: 86,142 - 119,412) across both urban and rural areas. As a percentage, this comprises 0.37 per cent (range: 0.35- 0.48 per cent) of the male population aged 18-59. This estimate incorporates adjustments related to mobility of PWID across multiple venues in a given geographic area (Cairo-Giza and Menia) and the number of doses purchased per PWID in Alexandria.. Extrapolation to the national level was challenging due to the limited amount of direct data from selected areas and the lack of information from rural areas. The PWID estimates can be interpreted as representing PWID who purchase or use drugs at known locations where drugs are sold or injected. Such individuals may be more easily contacted with prevention services through outreach. Individuals who inject exclusively in private settings (such as at residences) or in closed settings (e.g., prisons, jails, drug treatment centers) are not reflected in the estimates.

We note that the present study resulted in a larger estimate for MSM compared to the previous 2009 round of size estimates. The 2009 study estimated between 6451 and 914 MSM in Cairo and Alexandria, respectively, whereas we estimate 15,590 (7488, 27,767) in Cairo-Giza and 7937 (1159-10,730) in Alexandria; this study's estimates are significantly greater. The difference is due to both our inclusion of virtual mapping in addition to geographic mapping, and the methods employed for mapping, including the multiple adjustments applied.

The 18-59 year old urban male PWID estimates in this study, of 0.37 per cent (Menia), 0.51 per cent (Alexandria) and 0.58 per cent (Cairo-Giza), are comparable to findings from a 2008-2009 survey in Egypt. That survey found 0.4 per cent injection in upper Egypt, 0.1 per cent in coastal governorates and between 0.4 per cent and 1.2 per cent in Cairo (66); it was based on a convenience sample of males and females aged 16 and older found opportunistically at schools, work places and on the street. Thus, it cannot be considered representative. However, the consistency of results is notable. No definition or timeframe of injection practices were defined in the previous study and findings were not disaggregated by governorate. Similarly, the previously cited PWID national estimates of 57,000 – 120,000 encompassed the best estimate of 90,388 (range: 84,142- 139,205) suggested in this study[8].

[8] The governorates excluded from the estimates were considered too different from the areas where data were collected to apply a similar method of extrapolation. The populations represented by these areas – two per cent and four per cent of the total male and female household population, respectively, are small and including these governorates would probably not substantially alter the national estimates

In the absence of additional information about the methodology used to generate the earlier PWID national estimate, it is difficult to determine whether the results are expected to be comparable in terms of how PWID were defined, and what geographic areas were covered (e.g. urban and rural or just urban areas).

Key Population	Best Estimate		Lower Bound		Upper bound	
	No	%	No	%	No	%
Men who have sex with men (MSM)* ♂	64,318	0.62%	15,946	0.15%	90,914	0.87%
Female sex workers (FSW)** ⚥	22,986	0.24%	6,460	0.07%	26,792	0.28%
People who inject drugs (PWID)*** 💉	93,314	0.37%	86,142	0.35%	119,412	0.48%

By approximating the number of MSM and FSW in the vast majority of the country, the estimates presented here should be useful for programmatic purposes (e.g., setting targets for outreach and prevention that targets individuals at venues and MSM Internet sites) and for purposes of modeling the trajectory of the HIV epidemic.

Using the estimates presented in this report for target setting, requires specific information about the intervention design and how the indicators for service coverage are defined. For example, a prevention strategy for MSM that conducts outreach at physical venues to distribute condoms and promote behavior change may be best served calculating monthly outreach targets based on the estimated number of MSM at hotspots unadjusted for police crack downs (e.g. 6823 in Cairo-Giza) rather than the 'best estimate' that includes both geographic and virtually mapped MSM with adjustments for police crack downs (i.e. 11,599). Similarly, the target set for service coverage spread over a longer period of time, e.g. annualized target for number of PWID tested for HIV, should apply an adjustment accounting for the annual turnover in the population of PWID to the any estimate option chosen. Careful examination of program data may provide clues about turnover in the population. However, when deriving estimates of turnover from program data, care should be taken to utilize data from programs that are already scaled up, that is stable with respect to the population they reach. Otherwise, estimates of turnover derived from program data will reflect not only turnover but also scale-up effects.

Due to the high degree of uncertainty in the extrapolation methods used to generate the national PSE, target setting should be done at local (i.e. governorate) level and then summed to develop overall national level targets. The fact that the areas selected for mapping are in most cases the governorates that have been selected for HIV programmes, means that local target setting can rely on the best available data. Target setting for local areas without direct PSE data can apply extrapolation methods to develop interim targets. However, these targets should be refined after additional field experience and data collection in the local area.

When assessing the epidemic impact of HIV services for key population, programmes require a denominator based on an PSE incorporating all reasonable adjustments, i.e. the 'best estimate' and a further adjustment accounting for turnover in the population. When utilizing these size estimates for modeling the national epidemic, it is recommended to develop additional adjustments to incorporate MSM and FSW in rural areas and in the excluded governorates. This would need to be done through consensus or by additional data collection, as currently data are not available for these groups.

RECOMMENDATIONS

Future rounds of size estimation for key affected populations in Egypt can be strengthened considerably by improving the capacity of NGOs that work with KAPs in three key areas:

1. Strengthen local NGO's ability to access KAPs, in particular those who are not readily accessible at venues and FSW based at residences, and strengthening NGOs' ability to manage the safety risks of accessing PWID at street other outdoor locations. NGO capacity may be strengthened by partnering with NGOs elsewhere in the region and globally who can share best practices.

2. Improve understanding of FSW who are not using venues for their activities e.g., private residences, Internet or phone, who were unreachable in this study and whom NGOs believed comprise a large percentage of all FSW. This can be achieved by qualitative research and/or rapid assessment. The use of peer-referral may be a useful strategy to penetrate into these women's social networks as NGOs felt that apartment-based FSW know one another well, would be willing to recruit one another, and would be willing to present to a discrete study location.

3. Improve NGOs' programmatic data so that they can be used to develop multiplier size estimates in conjunction with future surveillance studies. Past BBSS in Egypt have employed respondent-driven sampling, a method which is appropriate for developing size estimates when combined with NGO program data. However, the quality of the NGO data must be improved well in advance of such studies.

4. For strategic planning, the main use of these size estimates (which are rough in some locations and more precise in others) is to use them for geographic prioritization of interventions.

    - This can be done by creating a data base of governorate-wise estimated sizes for each population and then ranking them according to estimated size. Those with > 1000 KPs should be the highest priority for interventions and in those areas more detailed mapping can be done in the early stages of intervention planning to provide precise programmatic targets. If NGOs (or government programs) are not in a position to scale up to reach those at risk, this represents a programmatic gap that needs to be filled.

    - The size estimates can also be used to set broad national targets.

    - Before using the size estimates for producing national estimates and projections (with SPECTRUM or by other method), informed assumptions about turnover should be made by technicians working on epidemiologic analysis in the country.

5. Lessons learned to take into account when conducting another study

- In addition to those things already mentioned, the biggest lesson learned was to collect additional information necessary for adjustment factors during level 2 mapping. This would include things like finding out how many people come to the site on usual peak days and usual non-peak days. Second, getting an estimate of the number of additional KAPs who might frequent sites on days other than peak days only (i.e., the number being missed on peak days). In addition, an idea of frequency of visiting sites (e.g. at least once a week, less than once a week but at least once a month) would allow for a better frequency adjustment.

- Given the very large number of MSM on virtual sites, techniques for conducting size estimation of that group, and measuring their overlap across sites and with mapped sites, should be given greater focus and perhaps a larger share of the resources.

- In the future, it would be helpful to validate how well the extrapolations worked by collecting data from a few rural sites and a few governorates where no data were collected, but where the assumption was that the presence of key population members was the same as in the mapped governorate for that region.

- To apply the PSE for target setting, additional local data on approximate turnover (i.e. the rate at which different key populations leave and join the population) would be valuable.

- PWIDs are notoriously difficult to map. For this population the RDS multiplier method might be more appropriate, however this should be done only in locations with large numbers of PWIDs – where interventions are in place and where IBBS or BSS studies are being done for other purposes. For the purpose of national strategic planning, the types of rough estimates obtained by this study should suffice. Given the resource intensity of conducting studies among key populations, more intensive studies should be done sparingly and only in those locations where they are most needed for programmatic purposes.

Annexes

Annex I – Men who have Sex with Men Questionnaire

The following questionnaire was applied to a convenience sample of MSM encountered during Level 2 hotspot visits.

1. Over the past 12 months, how many men have you had sexual relations with in [INSERT GOVERNORATE NAME]?

   Number of male partners _____

2. What kinds of places do you typically go to in [GOVERNORATE] to find new male sex partners?

   Mark all that apply.

   [ ] Cafes
   [ ] Hotels
   [ ] Public baths
   [ ] Saunas
   [ ] Public gardens
   [ ] Squares
   [ ] Train station
   [ ] Corniche
   [ ] Other. Specify _____

Responses to be updated based on Level 1 mapping
Delete responses that are not applicable in the governorate (e.g., Corniche)

3. In the last 7 days, what kinds of places did you go to in [GOVERNORATE] to find new male sex partners? *Mark all that apply.*

   [ ] Cafes
   [ ] Hotels
   [ ] Public baths
   [ ] Saunas
   [ ] Public gardens
   [ ] Squares
   [ ] Train station
   [ ] Corniche
   [ ] Other. Specify _____

4. Some men use the Internet to meet male sex partners. Which web sites or cell-phone apps do you typically use to find new male sex partners in [GOVERNORATE]? *Mark all that apply.*

   [ ] Hornet
   [ ] Grindr
   [ ] Mangem
   [ ] Facebook
   [ ] Other. Specify _____
   [ ] I don't use web sites or cell-phone apps to meet male sex partners. ***Skip remaining questions.***

   Responses to be updated based on Level 1 mapping

5. Some men have more than one account or profile on these sites. How many accounts or profiles do you have on the sites below, that you use to find new male sex partners in [GOVERNORATE]?
   Number of accounts/profiles on:

   ____ Hornet
   ____ Grindr
   ____ Mangem
   ____ Facebook
   ____ Other. Specify_____

   Responses to be updated based on Level 1 mapping

6. Over the past 7 days, what web sites or cell-phone apps did you use to find new male sex partners in [GOVERNORATE]? *Mark all that apply*

   [ ] Hornet
   [ ] Grindr
   [ ] Mangem
   [ ] Facebook
   [ ] Other. Specify _____

7. When do you typically use these web sites or cell-phone apps to find new male sex partners in [GOVERNORATE]? *Mark all that apply.*

   [ ] Mornings
   [ ] Daytime
   [ ] Evenings

8. How often do you typically use these web sites or cell-phone apps? *Mark one.*

   [ ] Every day
   [ ] A few times a week
   [ ] Once a week
   [ ] A few times a month
   [ ] Once a month
   [ ] Less than once a month

Annex II – Female Sex Workers Questionnaire

The following questionnaire was applied to a convenience sample of FSW encountered during Level 2 hotspot visits.

9. Over the past 12 months, how many men have you had sexual relations with in exchange for money or other benefits in [GOVERNORATE]?

   Number of male sex clients _____

10. What kinds of places do you typically go to in [GOVERNORATE] to find new sex clients? *Mark all that apply.*

   [ ] Cafes
   [ ] Bars
   [ ] Hotels
   [ ] Public bathhouses
   [ ] Discos
   [ ] Hairdressers
   [ ] On the street
   [ ] Corniche
   [ ] Other. Specify_____

   Responses to be updated based on Level 1 mapping

   Delete responses that are not applicable in the governorate (e.g., Corniche)

11. In the last 7 days, what kinds of places did you go to in [GOVERNORATE] to find sex clients?

   Mark all that apply.

   [ ] Cafes
   [ ] Bars
   [ ] Hotels
   [ ] Public bathhouses
   [ ] Discos
   [ ] Hairdressers
   [ ] On the street
   [ ] Other. Specify_____

12. Some women use the Internet to meet men to have sex with in exchange for money or benefit.

   Which web sites or cell-phone apps do you typically use to find sex clients in [GOVERNORATE]?

   Mark all that apply.

   [ ] Facebook
   [ ] Tagit
   [ ] My web site or a company website
   [ ] Other. Specify _____
   [ ] I don't use web sites or cell-phone apps to meet sex clients. ***Skip remaining questions.***

   Responses to be updated based on Level 1 mapping

13. Some women have more than one account or profile on these sites. How many accounts or profiles do you have on the sites below, that you use to find new male sex clients in [GOVERNORATE]?

Number of accounts/profiles on:
____ Facebook
____ Tagit
____ Other. Specify_____

Responses to be updated based on Level 1 mapping

14. Over the past 7 days, what web sites or cell-phone apps did you use to find sex clients in [GOVERNORATE]? *Mark all that apply*

[ ] Facebook
[ ] Tagit
[ ] My web site or a company website
[ ] Other. Specify_____

15. When do you typically use these web sites or cell-phone apps to find sex clients in [GOVERNORATE]? *Mark all that apply.*

[ ] Mornings
[ ] Daytime
[ ] Evenings

16. How often do you typically use these web sites or cell-phone apps? *Mark one.*

[ ] Every day
[ ] A few times a week
[ ] Once a week
[ ] A few times a month
[ ] Once a month
[ ] Less than once a month

Annex III – People Who Inject Drugs Hotspot listing format

GOVERNORATE NAME: GOVERNORATE CODE:

Serial #	District/ area	Hotspot Name	Lo-ca-tion	Hot spot type	Peak day & time	Estimated #PWID at peak: Most likely	Estimated #PWID at peak: Range	Name of data source and year	Type of data source	Reliability of data source

Instructions:

Governorate Name:	Standard names for districts should be used
Governorate Code:	Standard two-digit code
Serial #:	For each hotspot identified a serial number is assigned (in the order that the hotspot was identified).
District/area:	Standard names for smaller "areas" within governorates (e.g. districts or neighborhoods) should be used. Governorate teams may find it helpful to begin by listing all hotspots in one "area" and then moving on to other areas. Another strategy is to list all hotspots of a particular type (e.g. train lines, parks) and then move on to other kinds of hotspots.
Hotspot Name:	A place where PWID tend to be found buying or injecting drugs. Give each identified hotspot a short name that helps distinguish it from other hotspots. For example, the name of a park, bar or mall, or the name of the street corner where it is located, etc.
Location:	The more specific details of how the team can locate the hotspot should be described.
Peak day & time	Day and time when the highest numbers of PWID are usually at the hotspot
Estimated PWID at peak: most likely	The typical number of PWID who are at the hotspot at the peak time.
Estimated PWID at peak: range	The smallest and largest number of PWID who would be expected at the hotspot at the peak time. The range may be due to how the number present varies from week to week. For example, if the peak time is Fridays from 3pm to 5pm, then on a typical Friday at this time we might expect to find a range from between 5 to 15 PWID (note "5 to 15" as the range) and the most likely number on a typical Friday at this time might be 8.
Name of data source and year	Data sources may include records from treatment or rehabilitation facilities, expert opinion of key informants, outreach records, previous studies or mappings, or other kinds of reports. Note the name of the data source. Indicate the year the data are from.

Type of data source	Indicate whether the source of the estimate is: • Treatment/rehabilitation center client records • Outreach records • Previous study or mapping • Other report (specify kind of report) • Other (provide detail to clarify where the data are from)
Reliability of data source	Discuss the strengths and weaknesses of the data source. Discuss possible kinds of bias or error that may be present. After discussing, reach a consensus on the reliability of the data source on a scale of 1 to 3: '1' - not very reliable, actual number of PWID might be very different than the figure recorded '2' – somewhat reliable, data provide reasonable evidence of the actual number of PWID present at the location '3' - very reliable, little or no probability that the estimate is incorrect

Use the following codes to describe the type of hotspot. These categories may be useful in analyzing the characteristics of different types of hotspot. The categories differ in the approach to prevention work needed.

Hotspot type	**Code**	**Examples**
Street/road	ST	Street corner, along a street or road
Park	PA	Park, garden or greenspace
Terminal/station	TE	Train/metro station, bus terminal
Open area	OA	Train line, sea shore, corniche, harbor area, desert
Pharmacy	PH	Phamacy
Social/recreational area	SV	Mall, shopping center, market, food stall, on the grounds of a school, hospital, mosque or other building
Slum area	SL	Inside a slum – *combine with another code if it's a specific hotspot within a slum (e.g. SL-SV for a food stall in a slum area)*

Annex IV - Sex of reported HIV cases, 2012-2013

Governorate	Total cases	Male cases	Female cases	Male Percentage
Cairo	333	290	43	87%
Alexandria	250	218	32	87%
Giza	162	128	34	79%
Qalyoubia	99	85	14	86%
Daqahlia	78	66	12	85%
Gharbia	70	55	15	79%
Sharqia	34	27	7	79%
Fayoum	29	25	4	86%
Kafr Elsheikh	24	18	6	75%
Behira	20	16	4	80%
Souhag	19	15	4	79%
Assiut	16	14	2	88%
Portsaid	13	7	6	54%
Monoufia	12	11	1	92%
Ismailia	10	8	2	80%
Beni Souef	9	5	4	56%
Menia	9	7	2	78%
Suez	8	5	3	63%
Damietta	8	7	1	88%
Aswan	7	6	1	86%
Luxor	5	3	2	60%
Qena	5	3	2	60%
Red Sea	4	2	2	50%
North Sinai	2	1	1	50%
South Sinai	2	2	0	100%
Mattrouh	1	1	0	100%
TOTAL	**1229**	**1025**	**204**	**83%**

Source: calculation is based on NAP/MOH data.