Population Size Estimates for Most at Risk Populations for HIV In Bangladesh

2009

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Abbreviations

BSS	Behavioural Surveillance Survey
DIC	Drop-In Centres
GFATM	Global Fund for AIDS, Tuberculosis and Malaria
HATI	HIV/AIDS Targeted Intervention
IA	Implementing Agency
IDU	Injecting Drug User
MARP	Most At Risk Population
RSRA	Rapid Situation and Response Assessment

Tables

I. Introduction

The HIV epidemic in Bangladesh has remained at a low level since local health officials first began monitoring the situation in the 1990s. In a low level epidemic, understanding the potential for the epidemic to spread among vulnerable populations is of primary importance. Estimating sizes and risk behaviours among most-at-risk-populations (MARPS) is central to the task, and must be undertaken on a regular basis.

In Bangladesh, the size estimation process was first launched in 2003/2004. Since that time the methods and capacity for conducting population size estimation have improved and efforts to fill data gaps have increased in many countries including Bangladesh. In 2009, the National AIDS/STD Programme (NASP) in coordination with UNAIDS, NGOs, donor agencies and research organizations, initiated a process of updating National Population Size Estimates of MARPS, using the same collaborative and consultative process begun in 2004.

This report provides the results of the 2009 in-country process of updating Population Size Estimates for MARPs. The exercise has been undertaken at this juncture, not only because the previous estimates are already five years old, but because of newly available data that allows the country to improve upon previous estimates. A large-scale mapping exercise, known as the Rapid Situation and Response Assessment (RSRA) provided a major impetus for updating the 2004 estimates for IDUs and FSWs in particular.

The updated population size estimates contained in this report are based on the best information available at this time. As the country continues to collect more data, the estimates will be improved and refined.

General Approach

A National Committee was formed as a follow-on to the 2004 National Working Group on Size Estimation in Bangladesh. The Committee followed the same basic approach used in 2004, which involved examining all available data related to size estimation of MARPs in the country, convening small informal meetings with various partners to establish the validity and reliability of the data, and, through a consensus process, establishing the best possible estimates in local areas (districts) with data, and using these estimates to extrapolate to areas (districts) without data.

The main sources of data examined for the size estimation process in 2009 were:

- RSRA for IDUs and FSWs
- Programme service delivery data for IDUs, FSWs, Male Sex Workers , MSM and Hijras (also known as "motherlists)
- Behavioural Surveillance Surveys (BSS): sampling frame data and survey data for use in combination with programme-based multipliers

Ultimately the RSRA, conducted in 2008 and covering IDUs and FSWs in 54 of 64 districts, was the most recent and comprehensive source of data available for the 2009 estimate. It provided direct size estimates for IDUs, street-based sex workers, and for the first time, hotel and residence-based sex workers. This was in contrast to 2004, when direct size estimates from mapping were available in only 24 districts for IDUs (NASROB study, 2001[2]; in only a handful of districts for street-based sex workers (between 1997 and 2003) [1]; and not at all for hotel and residence-based sex workers.

Although a robust data source, the RSRA had to be used in combination with programme coverage data for the updated 2009 estimates, since the RSRA was designed to focus primarily on those MARPs *not* covered by interventions services. Attempts to use other data sources (such as the kind of BSS multipliers and sampling frame data that were used in the 2004 estimate) did not improve the estimates, so they were not used.

Summary of Results

The 2009 updated size estimates for injecting drug users (IDUs), female sex workers, clients of FSWs, and returning migrants in Bangladesh are presented in Table 1, followed by a brief synopsis for each group. Details about where the numbers come from are included in the Methodology section.

Table 1: 2009 Size Estimates for Most at Risk Populations in Bangladesh

Population Group	2009 Size Estimate		Population Proportion (15-49			
			Male		Female	
	Low	High	Low	High	Low	High
Male IDU	21,800	23,800	0.06%	0.07%		
Total FSW	63,600	74,300			0.19%	0.22%
Brothel	3,100	3,600				
Street	25,500	30,700			0.08%	0.10%
Hotel and Residence	35,000	40,000			0.10%	0.12%
Clients of FSW	2,714,000	3,733,000	8%	11%		
Returning Migrants	381,000	762,000				

Note: Numbers rounded to the nearest 100

Injecting Drug Users

The updated estimate of the number of male IDUs in Bangladesh in 2009 ranges between 21,800 and 23,800; (i.e. between 0.06% and 0.07% of the male population of the country). This estimate includes men who are primarily injectors (i.e. it does not include heroin smokers who occasionally inject). Updated estimates for female IDUs were not made since female injectors are difficult to access through mapping, and these size updates relied primarily upon mapping data. District level size estimates for IDUs can be found in Annex 1.

Female Sex Workers

The updated estimate of the number of FSWs in the country ranges between 63,600 and 74,300 (i.e. between 0.19%-0.22% of the female population). For the purposes of size estimation (and consistent with the way intervention programming is implemented), sex workers are divided into 3 subtypes: brothel-based, street-based, and hotel and residence-based. These categories are not mutually exclusive, and there can be substantial movement between the subtypes, particularly between hotel and residence based sex workers.

According to the methods used for this size estimate, about 25% of all FSWs in the country operate in Dhaka, the capital city, and hotel and residence-based sex workers constitute the largest overall subtype of sex workers. District specific size estimates for street-based sex workers can be found in Annex 2, for hotel and residence based sex workers in Annex 3, and for brothel-based sex workers in Annex 4.

Clients of female sex workers

The updated estimate for the size of the male clients of FSWs population is between 2.7 and 3.7 million. These numbers are based on general population surveys measuring the proportion of men who buy sex in a given year, combined with population projections indicating the size of the adult male population in 2008.

Returning External Migrants

The updated estimate of the size of returning migrants ranges between 381,000 and 762,000. These numbers are based on the same assumptions used for the 2004 estimate, but are updated with more recent data.

Other Populations

The focus of the 2009 updated size estimates is on IDUs, FSWs, clients of FSWs, and returning migrants. The remaining groups (MSW, MSM, hijras) did not have enough data to warrant updates of the estimates. Updates for these groups are planned as and when new data become available.

II. Methodology

This section of the report provides details on the methodology used for the 2009 updated size estimates.

Injecting Drug Users

The two primary sources of data used for the 2009 IDU size estimate were:

- Source 1: Rapid Situation and Response Assessment (RSRA) of IDUs completed between March and July 2008
- Source 2: HATI programme reports of the number of IDUs receiving services by district in December, 2008

Source 1: The RSRA was a mapping exercise supported by GFATM at the start of round 6 in 2008. Its purpose was primarily to identify IDUs who were *not* receiving services from intervention programs. IDUs were defined as "drug users who were primarily injectors and who had injected in the past one year". This definition does not include heroin smokers who inject drugs occasionally, and who may be at elevated risk of HIV transmission. The exercise covered 53 districts (out of a total of 64), and used a combination of qualitative and quantitative methods with primary and secondary informants to obtain a rough estimate of the numbers of "unserved" IDUs, (i.e. IDUs not receiving harm reduction services). All areas of the districts were mapped, including both those with and those without intervention services, with the understanding that even in "served" areas there may be "unserved" IDUs. The estimated number of unserved IDUs for each district was given as a range with low and high values.

Source 2: Information on the number of "served" IDUs, provided by the agencies implementing IDU programs were used to supplement the RSRA data in each district. The data came from the "motherlists", which are the registers maintained by the implementing agencies (IAs) to monitor active IDUs receiving services. The "motherlists" are kept current so that they reflect only those IDUs who received services in the past 3 months, with inactive IDUs being dropped from the active list.

Process for obtaining district level size estimates

- In the 53 mapped districts, the sum of source 1 and source 2 was used to obtain a direct size estimate for each district. The "low" values were obtained by adding the "low" value of source 1 to the value for source 2. The "high" value was obtained by adding the "high" value for source 1 to the value for source 2.
- In 8 non-mapped districts, where there was also no program data indicating the presence of IDUs, size estimates were derived indirectly using the following extrapolation procedure:
    1. Within each division a "proxy" district that was best matched to the unmapped districts in that division, in terms of population density and agro-ecological, socio-economic and/or socio-cultural factors, was chosen.
    2. High and low population-based proportions of male IDUs were calculated for the proxy districts, based on the high and low estimates for that district, divided by the number of adult males in the district.
    3. The high and low population-based proportion of IDUs from the proxy district within each division were then multiplied by the adult male population of the unmapped districts in the same division, to obtain the expected number of male IDUs in those districts.
- In the three unmapped districts that had available program data indicating the presence of IDUs, (Joipurhat, Jhalakathi and Patuakhali), the "served" numbers from the motherlists in those districts were used as direct district level size estimates, and no extrapolation was done.

Process for obtaining National level size estimate

The sum of the district specific estimates in all 64 districts (53 mapped, 8 extrapolated, and 3 using programme data only), were used to estimate the size of the total male IDU population

Female Sex Workers

The two primary sources used for the 2009 FSW size estimates were:

- Source 1: Rapid Situation and Response Assessment (RSRA) of Street, Hotel and Residence-based sex workers completed between in the first half of 2008 [3]
- Source 2: HATI and FHI programme reports of the number of FSWs receiving services by district as of November, 2008

Source 1: Similar to the IDU RSRA, the RSRA for FSWs was a mapping exercise supported by GFATM at the start of round 6 in 2008 to identify FSWs who were *not* receiving services from intervention programs. Street-based sex workers were mapped in 54 districts. Sex workers were defined according to the standard categories used in Bangladesh, i.e. street-based FSW were defined as those women who contact clients from open places such as street, parks, stations and playgrounds, and have sex in similar venues; and hotel and residence based FSWs were defined as women who operate in hotels and residences, and whose clients contact them

in hotels and residences. The results for each district were given as a range with a low and a high value.

For street and hotel-based sex workers, the RSRA teams used a time-location sampling approach to estimate the number of sex workers, whereas for the residence-based sex workers they used a nomination approach. The practical implication of this was that for street and hotel-based sex workers who were presumably more visible, the teams could directly count sex workers over the course of several visits to the venues where they congregate, and triangulate those estimates with indirect estimates obtained through key informant interviews as a cross-check. In this way they could obtain consensus on the number of sex-workers at each hotspot.

For residence-based sex workers, since there was no way to observe them for direct estimation, the nomination technique was used instead. This was basically a snowballing technique that relied on selected individuals (both residence based FSWs and key informants who interact closely with them), to provide a plausible range of the number of RBSW within their closed networks.

Source 2: Information on the number of "served" FSWs provided by the IAs was used to supplement the RSRA data in each district. The data came from the "motherlists", which are the registers maintained by the IAs to monitor active FSWs receiving services. The "motherlists" are kept current so that they reflect only those FSWs who received services in the past 3 months, with inactive FSWs being dropped from the active list.

Process for obtaining district level size estimates

Street-based sex workers

- In the 54 mapped districts, the sum of source 1 and source 2 was used to obtain a direct size estimate for each district. The "low" values were obtained by adding the "low" value of source 1 to the value for source 2. The "high" value was obtained by adding the "high" value for source 1 to the value for source 2.
- In 9 unmapped districts, where there was also no program data, size estimates were derived indirectly for each of the districts using the following extrapolation procedure:

    1. Within each division a "proxy" district that was best matched to the unmapped districts in that division, in terms of population density and agro-ecological, socio-economic and/or socio-cultural factors, was chosen.
    2. High and low population-based proportions were calculated for the proxy districts, based on the high and low estimates for that district, divided by the adult female population[1].
    3. The high and low population-based proportion of SBFSWs from the proxy districts within each division, were multiplied by the adult female population in

[1]. This is different from the 2004 estimates, which calculated the number of sex workers as a proportion of the male population instead of the female population.

each unmapped district of that division, to obtain high and low estimates, of the expected number of SBFSW in that district.

- In the remaining unmapped district (Bogra), the "served" number from the motherlist was used as a direct district level size estimate, and there was no extrapolation of "unserved" SBFSW in that district.

- The sum of the district specific estimates in all 64 districts was used to estimate the size of the total SBFSW population.

Hotel and residence-based sex workers

- A separate but identical process was used to estimate the size of hotel and residence-based sex workers as that used for the street-based sex workers.

Brothel-based sex workers

The primary data source for brothel based FSWs is the sampling frame from the behavioral surveillance surveys. This sampling frame is developed by conducting a complete census (i.e. count) of all sex workers in the country's 14 brothels. Unlike many other countries in Asia, the number of brothels in Bangladesh is not numerous, but the individual brothels tend to be large, with 250 or more women, on average, in residence. Because the sampling frame is a full census, the size estimates from this source are believed to be fairly reliable. The last round of surveillance was conducted in 2006/2007. Since there are no more recent data, the 2006/2007 figures have been used to update the size estimates for this population. The total number of brothel-based sex workers is estimated to be approximately 4000. Brothel specific size estimates can be found in Annex 4.

Clients of Female Sex Workers

Clients of sex workers are another group for whom direct size estimates are not available. While BSS data furnish some helpful information about risk behaviours among proxy groups of clients (e.g. truck drivers, rickshaw pullers, and male students), these data alone cannot be used to understand the size of the total male client population.

For the 2004 estimate, a combination of general population data from a limited number of surveys was combined with data on FSW size and mean number of clients, to estimate the number of commercial sex transactions in a one-year time period. A similar approach was followed in 2009 using data from more recent surveys. Specifically, data from a male sexual health survey conducted in 2005 in urban and rural areas of three divisions of Bangladesh found that between 8-11% of men reported buying sex in the past year [4]. This is similar to the high estimate for clients used in the 2004 size estimate (which was 10%). If we apply the 8-11% proportions to the updated population figures for males age 15-49, the updated estimate of the number of FSW clients in the country ranges between 2,714,000 and 3,733,000. Most of the

increase over the 2004 figures represents population growth, but is also attributed to the higher figures found in the 2005 study.

On the sex workers side, data from the RSRA suggested a high client turnover among all categories of sex workers (i.e. between 13 and 21 clients per week)[3]. Although these data were not from a representative sample of sex workers, they covered a broad spectrum of sex workers in the country, since the RSRA was conducted in nearly all districts. While the mean number of clients reported per week was high in the RSRA, it was lower than the 40+ clients per week reported by hotel-based sex workers in earlier surveys. If we consider the average number of clients per week available for the different types of sex workers from the RSRA study as indicative of the number of sex transactions, we observe that 8-11% of men would have to buy sex an average of 15-21 times per year (see Table 2) to match the sex workers numbers. These estimates are somewhat more reasonable than the 2004 estimates, but they still suggest the need for more data to explain client turnover, frequency of buying sex, and categories of sex workers they buy from.

Table 2: Average # of commercial sex transactions based on estimated number of clients and sex workers

Type of Sex Worker	Avg. # of clients per week	Avg. estimated population size	Estimated # of sex transactions per year (based on # of clients reported by FSW)	Average # of commercial sex transactions per client per year	
Street-based	16.5	3350	2,874,300	Low (assumes 11% of men buy sex)	High (assumes 8% of men buy sex)
Hotel and residence-based	17	28100	24,840,400		
Brothel-based	16	37500	31,200,000		
Total			58,914,700	15	21

Returning External Migrants

People working outside of Bangladesh for extended periods of time, and then return to the country, are no doubt an important vulnerable population at risk of becoming infected with HIV and potentially infecting others. Work-related migration is common and a large proportion of the currently reported HIV infections in Bangladesh are among returning migrants. However, despite the large number of people who travel abroad for work, the proportion of migrants who actually travel to places with HIV epidemics, and who practice high risk behaviours when in those places, may be relatively small.

A likely reason why migrants account for such a large proportion of reported HIV infections is because they represent a large number of people who are tested for HIV. Sometimes HIV positive migrants are tested for HIV abroad and sent back to Bangladesh when they are found to be infected, which is how their infections come to the attention of the medical system.

As of 2008, Saudi Arabia was the largest employer of Bangladeshi migrant workers. Other countries that are major destinations for Bangladeshi migrant workers include the United Arab Emirates, Malaysia, and several other countries of the Middle East, North Africa and Southeast Asia.

The number of returning migrants used in the 2004 estimate focused on officially documented workers leaving the country in 1999 for work, and presumably returning between 2002-2003 (between 268,000 and 536,000). Using similar logic, in 2006, 381,000 documented workers left the country for work, so that number or more are expected to have returned in 2009. If we assume that an equal number of people left the country unofficially to work abroad (which was the assumption in 2004), that would be 762,000 in total. These numbers can be used provisionally as the low and high estimates of numbers of returning migrants. However, it must be acknowledged that these figures do not provide a realistic indication of the appropriate "denominator' (i.e. number of at-risk migrants).

III. Limitations

Assumptions and sources of bias

Use of the RSRA and HATI program data for size estimation relied on several assumptions which are summarized in Table 3 along with the likely direction of the bias if these assumptions were violated.

Table 3 Potential sources of bias using RSRA mapping data and programme coverage data for size estimation

Potential for Over-counting	Potential for under-counting	Potential for Bias in Unknown Direction
<u>All Groups</u> ***Overlap* in two main data sources given the time-lag between them** **Double-counting** ▪ **Related to mobility** ▪ **Related to the inability of field teams to keep track of individuals counted**	**<u>All Groups</u>** ***Hidden*** nature of population ▪ Some members do not go to sites ***Frequency*** ▪ Some members go infrequently to sites, and will be missed ***State of Emergency*** ▪ Data (in 2008) was collected during state of emergency when risk populations may have been more "underground" **<u>Injecting Drug Users</u>** ▪ Only street-based IDUs were included. More wealthy, home-based, and females IDUs may have been more likely to be left out **<u>Hotel and Residence Based Sex Workers</u>** ▪ Due to stigmatized nature, especially in smaller towns, residence based sex worker may be very "silent" and therefore missed by mapping exercises.	**<u>All Groups</u>** ***Population Turnover*** ▪ Movement in and out of the population not constant over time could result in over or underestimate, depending on the timing. ▪ "Seasonality" ***Extrapolation:*** ▪ Unknown similarity between areas with data and areas without data (the former are used to derive estimates for the latter)

Each of these sources of bias must be considered, and taken into account for the 2009 estimate.

Potential for Overlap The procedure for obtaining population size estimates in Bangladesh was somewhat unusual in that it combined two complimentary data sources i.e. "served" and "unserved". To the extent that there was overlap in these data sources, double-counting could have occurred, leading to an overestimation of the number of MARPS. Overlap could have occurred because of the time-lag between the two data sources (i.e. the programme data reflected a period several months later than the RSRA data, so a portion of the unserved population counted in the RSRA could have started receiving services in the interim, and therefore have been counted again in the programme service delivery data).

Double Counting Aside from the overlap, other reasons for double-counting relate to the mobility of the population, where population member are counted more than once if they frequent multiple sites, or the likelihood of counting the same person more than once at the same site. This likelihood of this type of double-counting is greater when field-teams visit sites at different times of the day or on different days of the week.

Hidden Population Although the mapping exercise attempted to count all "unserved" members of the population, there were reports when the Global Fund project started, that in many instances they found (and started providing services to) more unserved IDUs than what had been identified through mapping. This suggests that the mapping exercise was not able to capture the entire unserved population. It stands to reason that this would be the case, for several reasons:

- The methodology assumes that the majority of MARPs actually frequent or operate in public venues. To the extent that MARPs are "hidden" (e.g. IDUs who inject only in private places, or sex workers who connect with their clients outside of mapped solicitation sites (e.g. through phone, internet or other private channels), some unknown portion of each of these populations would have been missed by the RSRA, resulting in a possible underestimation of the numbers.

- The group that is "mappable" at a specific period in time depends on the frequency with which people visit the sites. If mapping occurs during a one-week time period, it may capture the majority of people who visit the site that week, but will miss the people who come less frequently because field teams typically do not spend more than one week at any given site. Depending on how MARPs are defined, (for example IDUs were defined as all those who had injected in the past year), it would not be possible to estimate that number without making an adjustment for those who frequent sites less often.

- The RSRA took place within the two-year period when the country was in a "state of emergency" because of political tensions. In this situation, illegal activities were considered to be more underground and hidden than usual, which could have also resulted in undercounts.

Population Turnover One of the limitations of mapping is that it captures current MARPs, whereas the definition of MARPS for estimation purposes tends to be the number who practiced the behaviour in the past one year). At any given point in time, a mapping exercise

will miss a certain proportion of people who leave the population (e.g. stop injecting, stop selling sex), but it will also capture a portion of the population who have recently entered. To the extent that turnover is steady, with approximately equal numbers entering and leaving the population, the effects of the turnover should not drastically affect the estimates.

Extrapolation Mapping data were not available for all districts. In those districts without mapping, extrapolation was done. The assumption behind extrapolation is that those areas without data exhibit the same characteristics as those areas with data, and therefore the attributes of the areas with data can be "assigned" to the areas without data. For example, it mapping data in a district that share a border with China indicate that 0.5% of the males are IDUs, it might be assumed that the same was true in other district sharing a border with China. Thus the proportion of 0.5% would be assigned to the male populations of districts that share a border with China. If the assumption did not hold true, the extrapolated value could end up being an under or over-estimate of the true value.

How reliable are these estimates?

Given all the potential sources of bias, how can we judge whether these number are reliable? A quick look at Table 1Table 3 tells us that factors that can lead to an underestimate of MARPs are more numerous than those that can lead to overestimates. If the goal is to map the number of people at risk during a year's time, then mapping is inherently likely to underestimate the number. Mapping also misses that portion of the population that is not visible or accessible at public venues.

By the same token, there is a distinct possibility that the overlap in the two data sources (RSRA and HATI programme coverage data) that were combined to produce estimates of the IDU, street-based FSW, and hotel and residence based FSW populations, overestimated the numbers that might have been mapped if served and unserved populations had both been mapped/counted at the same time.

There is no way to measure the exact magnitude of these biases. But it is important to be aware of them, and to make sure the numbers are plausible, based on consensus with the various stakeholders.

IV. Discussion and Conclusions

The 2009 size estimates for IDUs and FSWs are based on much more extensive data than was available in 2004. The RSRA covered nearly all districts in the country and was the most comprehensive attempt to identify MARPs in Bangladesh to date. With the RSRA data, it was possible to rely more on direct estimates and less on extrapolation and inflation factors, than in 2004.

How do these 2009 numbers compare to 2004 numbers?

The total number of IDUs and the total number of FSWs in 2009 fall within the lower and upper bounds of the 2004 estimates for the same groups (see Table 4). The main differences

are a somewhat narrower range for both IDU and FSW estimates, and a larger proportion of hotel and residence based sex workers than street-based sex workers (in contrast to 2004 when street-based sex workers made up the larger share). The shift from street-based to hotel and residence-based does not necessarily represent a change in the total size of the population of sex workers, but rather the existence of better data on hotel and residence based sex workers than was available in 2004.

Increases in the number of clients of sex workers reflect more recent data indicating that the proportion of men in the country who buy sex ranges from 8-11% (rather than 6-10%). This combined with population projections account for the higher figures.

Increases in the number of returning external migrants reflect increases in the demand for Bangladeshi labour, mostly in Middle Eastern and Southeast Asian countries, but, as already mentioned, more efforts are needed to estimate the size of the migrant population that is actually at risk.

Table 4: Comparison between 2009 and Previous Estimates

Population Group	2009 Size Estimate		2004 Estimate	
	Low	High	Low	High
Male IDUs	21,800	23,800	20,000	40,000
Total Female FSW	63,600	74,300	54,600	90,000
Brothel	3,100	3,600	3,600	4,000
Street	25,500	30,700	37000	66,000
Hotel and Residence	35,000	40,000	14,000	20,000
Clients of FSW	2,714,000	3,733,000	1,882,080	3,135,800
Returning Migrants	381,000	762,000	268,000	536,000

Why were size estimates for some populations not updated?

Male Sex Workers and Men Who Have Sex with Men

In 2004, the estimated size of the MSW and MSM population was 0.2% of the male population of the country. This 0.2% represented only those MSW and MSM who were most visible and most-at-risk. In 2009, there were no new data sources available for improving upon the 2004 estimate. The primary sources of data available in 2009 were the programme coverage numbers from several NGOs working with these communities. Consensus meetings were held with these NGOs, and programme coverage data were shared. However, those data were focused only on those MARPs who had already been reached. These data, while excellent for estimating the "numerator" for programme coverage, were not suitable for estimating the "denominator" or total size of the at-risk population.

BSS data were also used in conjunction with programme based multipliers to estimate total population sizes. Attempts to use more recent BSS data in a similar fashion for 2009 were not successful, due to the difficulties in finding appropriate multipliers that corresponded to the BSS data.

In the end, due to the lack of new data sources to improve upon the MSW/MSW estimate from 2004, it was decided to wait until more data were available. The ongoing RSRA among MSW/MSM should be an appropriate source.

Hijras

Similar to the MSW/MSM group, there were no new data sources available for improving upon the 2004 estimate.

Why were more data sources not used?

It is risky to use data from BSS/IBBS surveys in a haphazard manner (i.e. when the surveys are not planned specifically taking the multiplier method into account) because of the many difficulties of assessing over- or underestimation, either of which can be common depending on how the multiplier method is implemented.

For the 2004 estimates, although there was a limited amount of data available, the data that did exist came from a variety of different sources including mapping, capture-recapture studies, programme coverage data, and BSS data. Very few districts had multiple sources of data, but in places where there were multiple sources, the ratio between the two was frequently used to derive adjustment factors that could be applied to the places with only one data source. The supposition inherent in these adjustments was that the relationships between data sources in locations with multiple sources, were also applicable in other locations. For example, in cases where mapping numbers were larger than programme coverage numbers in a group of district that had both data sources; this relationship was used to derive an inflation factor that could then be applied locations that had only programme coverage data. Similarly, in the handful of districts that had BSS data, inflation factors derived from the BSS multiplier were used to adjust mapping and programme data. In general, assumptions about the relationships between the various data sources had to be made in the absence of empirical data to validate those assumptions, but they were used anyway because of the paucity of available data. The availability of the RSRA data in nearly all districts of the country for IDUs and FSWs, made these types of adjustments unnecessary in 2009

Remaining Gaps and Recommendations for Future Size Estimates

As noted in the section on limitations, although there are more data available now than there were in 2003/2004, there are still many gaps, especially for MSM/MSW and hijras, as well as for migrants at risk of HIV infection.

The mapping data coming from the new RSRA should be very helpful in revising the estimates for MSM and MSW. However, much better mapping of at-risk migrants is essential (i.e. number

of migrants traveling to high prevalence areas and engaging in high risk activities in those locations).

Mapping is an extremely useful tool for size estimation, however, future mapping exercises can be made much more useful if they collect data that allows for adjustments that can address the limitations of mapping. Rather than inflate the numbers to account for an hidden or missing portions of the population in a haphazard way, future mapping exercises should build in mechanisms for estimating the proportion of the population that might be hidden, as well as the make adjustments for frequency of visiting sites and population turnover.

Annex 1: District Level Size Estimates for IDUs

Division	District	IDUs Served by Program 2008 (1)	IDUs Without Services (Source: RSRA) (2)		Extrapolated Sizes of IDUs in non-mapped districts (3)		Total Size Estimate of IDUs (1+2+3)	
			Low	High	Low	High	Low	High
Dhaka	Dhaka	3063	1,355	1,582			4,418	4,645
	Faridpur	8	265	283			273	291
	Gazipur	249	463	495			712	744
	Gopalganj				180	192	180	192
	Jamalpur		265	365			265	365
	Kishoreganj		220	270			220	270
	Madaripur				165	176	165	176
	Manikganj				209	223	209	223
	Munshiganj		25	32			25	32
	Narayanganj	204	320	345			524	549
	Mymensingh	530	365	405			895	935
	Netrokona		90	104			90	104
	Narisindhi	52	78	92			130	144
	Rajbari				154	164	154	164
	Sherpur		60	72			60	72
	Shariatpur				144	153	144	153
	Tangail		150	220			150	220
	Total	**4,106**	**3,656**	**4,265**			**8,614**	**9,279**
Rajshahi	Bogra		0	0			0	0
	Chapai Nawabganj	487	105	140			592	627
	Dinajpur	403	390	510			793	913
	Gaibandha		25	40			25	40
	Joipurhat	81					81	81
	Kurigram		0	0			0	0
	Lalmonirhat		0	0			0	0
	Natore		35	50			35	50
	Nilphamari		0	0			0	0
	Naogaon	224	220	285			444	509
	Panchagar				104	135	104	135
	Pabna	217	15	20			232	237
	Rajshahi	559	715	1,010			1274	1569
	Rangpur	238	20	35			258	273
	Sirajganj	290	45	60			335	350
	Thakurgaon		155	200			155	200
	Total	**2,499**	**1,725**	**2,350**			**4,328**	**4,984**

Division	District	IDUs Served by Program 2008 (1)	IDUs Without Services (Source: RSRA) (2)		Extrapolated Sizes of IDUs in non-mapped districts (3)		Total Size Estimate of IDUs (1+2+3)	
			Low	High	Low	High	Low	High
Chittagong	Bandarban		13	18			13	18
	B. Baria		8	14			8	14
	Chittagong	49	480	520			529	569
	Cox's Bazar	419	392	415			811	834
	Comilla		1,095	1,142			1095	1142
	Chandpur	225	4	10			229	235
	Feni		165	184			165	184
	Khagrachari		38	52			38	52
	Laxmipur		28	34			28	34
	Noakhali		63	78			63	78
	Rangamati		92	104			92	104
	Total	**693**	**2378**	**2571**			**3,071**	**3,264**
Kulna	Khulna	600	687	715			1287	1315
	Chuadanga		237	248			237	248
	Jhenaidah	90	167	193			257	283
	Jessore	220	21	28			241	248
	Khustia	120	98	112			218	232
	Meherpur		330	355			330	355
	Bagerhat	270	76	83			346	353
	Magura		20	26			20	26
	Narail				34	35	34	35
	Sathkhira	310	370	392			680	702
	Total	**1,610**	**2,006**	**2,152**			**3,650**	**3,797**
Barishal	Barishal	850	480	560			1330	1410
	Bhola		0	0			0	0
	Barguna				46	46	46	46
	Jhalakathi	80					80	80
	Patuakhali	75					75	75
	Pirojpur		60	90			60	90
	Total	**1,005**	**540**	**650**			**1,591**	**1,701**
Sylhet	Sylhet	41	110	150			151	191
	Moulovibazar	128	55	70			183	198
	Sunamganj		20	30			20	30
	Hobiganj		145	195			145	195
	Total	**169**	**330**	**445**			**499**	**614**
	Total 6 Division	**10,082**	**10,635**	**12,433**	**1,035**	**1,123**	**21,752**	**23,638**

Annex 2: District Level Size Estimates for Street-Based Sex Workers

Division	District	SBFSW Served by Program 2008 (1)	SBSW Without Services in 2008 (Source RSRA) (2)		Extrapolated values in non-RSRA districts (based on population density (3)		Total Estimate of STFSW (1+2+3)	
			Low	High	Low	High	Low	High
Dhaka	Dhaka	2,688	3,945	5,385			6,633	8,073
	Faridpur				81	97	81	97
	Gazipur		605	696			605	696
	Gopalganj				52	62	52	62
	Jamalpur		100	120			100	120
	Kishoreganj		234	279			234	279
	Madaripur				50	61	50	61
	Manikganj				63	76	63	76
	Munshiganj		124	174			124	174
	Narayanganj		258	330			258	330
	Mymensingh		1,355	1,674			1,355	1,674
	Netrokona		149	187			149	187
	Narisindhi		121	151			121	151
	Rajbari				44	52	44	52
	Sherpur		170	222			170	222
	Shariatpur				46	55	46	55
	Tangail		300	340			300	340
	Total	**2,688**	**7,361**	**9,558**	**336**		**10,385**	**12,649**
Rajshahi	Bogra	289					289	289
	Chapai Nawabganj		243	330			243	330
	Dinajpur		590	735			590	735
	Gaibandha		56	70			56	70
	Joipurhat				62	78	62	78
	Kurigram		102	150			102	150
	Lalmonirhat		308	332			308	332
	Natore		113	124			113	124
	Nilphamari		0	40			0	40
	Naogaon		165	210			165	210
	Panchagar				145	181	145	181
	Pabna		198	273			198	273
	Rajshahi	1,135	0	0			1135	1135
	Rangpur		120	160			120	160
	Sirajganj		31	40			31	40
	Thakurgaon		80	100			80	100
	Total	**1,424**	**2006**	**2564**	**207**		**3,637**	**4,247**

Division	District	SBFSW Served by Program 2008 (1)	SBSW Without Services in 2008 (Source RSRA) (2)		Extrapolated values in non-RSRA districts (based on population density (3)		Total Estimate of STFSW (1+2+3)	
			Low	High	Low	High	Low	High
Chittagong	Bandarban		230	286			230	286
	B. Baria		189	245			189	245
	Chittagong	1190	520	801			1710	1991
	Cox's Bazar	400	189	351			589	751
	Comilla	313	23	56			336	369
	Chandpur	200	0	25			200	225
	Feni	200	38	95			238	295
	Khagrachari		99	131			99	131
	Laxmipur		279	353			279	353
	Noakhali	200	285	354			485	554
	Rangamati		158	210			158	210
	Total	**2503**	**2010**	**2907**			**4,513**	**5,410**
Kulna	Khulna	1125	355	555			1480	1680
	Chuadanga		256	318			256	318
	Jhenaidah		188	243			188	243
	Jessore	262	848	1139			1110	1401
	Khustia		259	301			259	301
	Meherpur		326	383			326	383
	Bagerhat	91	153	209			244	300
	Magura		184	241			184	241
	Narail		166	215			166	215
	Sathkhira		219	268			219	268
	Total	**1,478**	**2954**	**3872**			**4,432**	**5,350**
Barishal	Barishal	1125	0	0			1125	1125
	Bhola		102	142			102	142
	Barguna		83	106			83	106
	Jhalakathi				86	97	86	97
	Patuakhali		182	206			182	206
	Pirojpur		137	167			137	167
	Total	**1,125**	**504**	**621**	**86**		**1,715**	**1,843**
Sylhet	Sylhet	200	273	400			473	600
	Moulovibazar		96	166			96	166
	Sunamganj		230	285			230	285
	Hobiganj		130	180			130	180
	Total	**200**	**729**	**1031**			**929**	**1,231**
	Total 6 Division	**9,418**	**15,564**	**20553**	**629**	**759**	**25,611**	**30,730**

Annex 3: District Level Size Estimates for Hotel and Residence Based Sex Workers

Division	District	Hotel/Residence FSW Served by Program 2008 (1)	HRBSW Without Services in 2008 (Source: RSRA) (2)		Extrapolated Sizes of HRBSW in Unmapped Districts (Based on Population Density) (3)		Total Size Estimate of Hotel/Residence FSW (1+2+3)	
			Low	High	Low	High	Low	High
Dhaka	Dhaka	4,205	2833	3708			7,038	7,913
	Faridpur				466	516	466	516
	Gazipur		32	40			32	40
	Gopalganj				299	332	299	332
	Jamalpur	462	115	178			577	640
	Kishoreganj	466	68	133			518	578
	Madaripur				291	323	291	323
	Manikganj				366	406	366	406
	Munshiganj		234	300			234	300
	Narayanganj	465	44	128			509	593
	Mymensingh		373	484			373	484
	Netrokona	418	222	294			640	712
	Narisindhi	460	0	0			460	460
	Rajbari				251	279	251	279
	Sherpur		97	115			97	115
	Shariatpur				263	292	263	292
	Tangail	787	240	352			937	1,139
	Total	**7,263**	**4,258**	**5,732**	**1,936**	**2,148**	**14,899**	**17,294**
Rajshahi	Bogra	486					486	486
	Chapai Nawabganj		134	235			134	235
	Dinajpur	350	72	178			434	477
	Gaibandha		150	175			150	175
	Joipurhat				178	202	178	202
	Kurigram		211	275			389	477
	Lalmonirhat	360	28	175			388	535
	Natore	340	0	0			340	340
	Nilphamari		373	480			373	480
	Naogaon		109	150			109	150
	Panchagar				417	471	417	471
	Pabna	280	0	90			445	583
	Rajshahi	450	108	273			558	723
	Rangpur		190	235			190	225
	Sirajganj		195	245			195	245
	Thakurgaon		230	260			230	260
	Total	**2,266**	**1,965**	**2,974**	**595**	**673**	**4,838**	**5,862**

Division	District	Hotel/ Residence FSW Served by Program 2008 (1)	HRBSW Without Services in 2008 (Source: RSRA) (2)		Extrapolated Sizes of HRBSW in Unmapped Districts (Based on Population Density) (3)		Total Size Estimate of Hotel/Residence FSW (1+2+3)	
Chittagong	Bandarban		58	81			58	81
	B. Baria		53	76			53	76
	Chittagong	803	630	971			1433	1774
	Cox's Bazar	1175	82	297			1257	1472
	Comilla	1247	225	271			1472	1518
	Chandpur		212	234			212	234
	Feni		42	56			42	56
	Khagrachari		349	440			349	440
	Laxmipur		5	7			5	7
	Noakhali		68	91			68	91
	Rangamati		155	198			155	198
	Total	**3225**	**1879**	**2722**			**5,104**	**5,947**
Kulna	Khulna	1226	0	0			1226	1226
	Chuadanga		226	288			226	288
	Jhenaidah		133	162			133	162
	Jessore	687	717	953			1404	1640
	Khustia		130	154			130	154
	Meherpur		17	22			17	22
	Bagerhat	604	0	0			604	604
	Magura		240	295			240	295
	Narail		94	121			94	121
	Sathkhira		260	295			260	295
	Total	**2,517**	**1,817**	**2,290**			**4,334**	**4,807**
Barishal	Barishal	567	0	0			707	747
	Bhola		104	170			104	170
	Barguna		118	150			118	150
	Jhalakathi				317	385	317	391
	Patuakhali	670	0	145			670	826
	Pirojpur	250	28	66			278	316
	Total	**1,487**	**250**	**531**	**317**	**385**	**1,877**	**2,209**
Sylhet	Sylhet	2126	102	582			2778	3258
	Moulovibazar	1511	32	345			1943	2229
	Sunamganj	320	139	293			459	613
	Hobiganj	360	104	242			464	602
	Total	**4317**	**377**	**1462**			**5,961**	**7,093**
	Total 6 Division	**21,075**	**10,546**	**15,711**	**2,849**	**3,206**	**34,470**	**39,992**

Annex 4 Brothel-Specific Size Estimates for Brothel-Based Sex Workers

Brothel Name	Brothel location	Total sex workers	Active Sex Worker
Banishanta	Mongla	180	132
Bagerhat	Bagerhat	63	57
Fultala	Khulna	79	69
Marowari Mondir	Jessore	129	122
Jhalaipatti	Jessore	36	36
Babu Bazar	Jessore	35	35
Rothkhola	Faridpur	341	315
CNB Ghat	Faridpur	179	149
Puran Bazar	Madaripur	278	243
Patuakhali	Patuakhali	62	54
Ganginarpar	Mymensingh	174	162
Rani Bazar	Jamalpur	196	183
Kandapara	Tangail	703	664
Daulatdia	Rajbari	1145	921
Total		**3600**	**3142**

Notes:

For use with client PSE:

- Street-based sex workers entertain 16 clients per week (ICDDR, B FSW mapping p. 9
- Hotel and Residence based sex workers average 61 clients per week (same source)

Recommendations

- In the future, what to do with heroin smokers? Since the mapping was of those who are primarily injectors…but it doesn't exclude smokers. But for people who smoke and only sometimes inject, they are missed…is that important? How could it be dealt with?

- For people who are injectors…ask what proportion also smoke occasionally
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