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Variations in the population size, distribution and client volume among female sex workers in seven cities of Pakistan

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Abstract

Objectives: To describe the size and distribution of female sex worker (FSW) populations and the distribution of client-FSW encounters in seven major cities of Pakistan.

Methods: Mapping of FSWs was done using a two-stage process of identifying and validating locations where FSWs solicit and/or meet clients, estimating the size of the FSW population at each location and describing the type of sex work. A sample survey of FSWs was conducted to collect data on sociodemographic and behavioural data. Survey data on client volume were analysed to assess the distributional inequality of client sexual encounters in each of these cities. The overall distributional inequality in client-sex worker encounters across the entire FSW population within a city was assessed by drawing Lorenz curves and computing the Gini coefficient.

Results: A total of 34 480 FSWs (40% street-based, 57.5% home-based and 2% brothel-based) were mapped in the seven cities. Of these, 2869 participated in behavioural and biological surveys. The median age of FSWs surveyed was 26 years with sexual debut at 18 years. The contribution of different types of FSWs to the total client volume differed substantially between cities, with the contribution of home-based FSWs ranging from 32% to 75%. The overall distributional inequality in client volume also varied substantially between cities, with the Gini coefficient ranging from 0.22 (low inequality) to 0.50 (high inequality).

Conclusions: The relative size and distribution of sex workers and the sex worker-client patterns differs considerably in cities of Pakistan. Programmes should be planned and implemented accordingly.

Introduction

Although much remains to be learned about the HIV epidemic in Pakistan, it appears that transmission currently remains concentrated in specific vulnerable populations-chiefly injecting drug users (IDUs), men who have sex with men (MSM) and transgender populations,[1] Several recent surveys have shown that, although the prevalence of HIV remains low among female sex workers (FSWs) in Pakistan, their risk is high and the epidemic potential is considerable.[2,3] Condom use is low and a substantial proportion of FSWs report sexual partnerships with IDUs, among whom the epidemic is far advanced in several cities.[3] The relative size of FSW populations in some cities and their high number of sexual partners suggest that the expansion of the HIV epidemic in Pakistan is likely to be strongly influenced by the extent of the epidemic among FSWs and their clients. For example, one study in the city of Lahore found that 7% of migrant male workers reported visiting an FSW in the previous 12 months.[4] Accordingly, Pakistan's National AIDS Control Program (NACP) and each of the Provincial AIDS Control Programs (PACPs) have placed a high priority on scaling up targeted prevention programmes for FSWs in major cities. There are substantial demographic, sociocultural and economic differences between Pakistan's cities and, as observed in other contexts, these factors are likely to foster dissimilar sex work structures.[5-7] Targeted prevention programmes therefore have to vary according to the local organisational structures of sex work. In addition, variations in the configuration of sex worker-client network patterns are likely to result in different HIV transmission dynamics. A modelling study by Ghani and Aral8 has shown that, in addition to the relative size of the FSW and client populations, the transmission dynamics of both short duration (gonorrhoea) and long duration (herpes simplex virus-2) sexually transmitted infections are influenced by variation in the number of client contacts per FSW and whether clients repeatedly visit the same FSW.[8] In this study we examined the distribution of client-sex worker encounters in seven cities of Pakistan.

Methods

Data were collected as part of Pakistan's Second Generation Surveillance system, implemented by the Canada-Pakistan HIV/AIDS Surveillance Project (HASP) and funded by the Canadian International Development Agency (CIDA). Data collection involved two main processes:

- mapping to determine the population size, distribution

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and type of FSWs and other highrisk groups;

◆ a survey to assess behaviour patterns and the prevalence of HIV in these groups.

Data for the present study were collected in the first round of surveys in 2005 in the following seven cities: Karachi, Lahore, Faisalabad, Multan, Hyderabad, Sukkur and Quetta.

Mapping:

Our mapping methodology was based largely on the understanding that most FSWs-particularly those who are most active-congregate and/or meet clients in definable geographical locations. Accordingly, our approach was to focus on identifying these locations, characterising each location in terms of specific "spots" within that location and the operational characteristics of sex work there (ie, how and where FSWs meet clients and where transactions occur), and estimating the number of FSWs that frequent the location and spots. This approach is an adaptation of the PLACE (priorities for local AIDS control efforts) methodology described by Weir and colleagues9 which identified locations where individuals frequented to acquire new sexual partners. We incorporated two levels of data collection and analysis. Level 1 involved a systematic process of interviewing secondary and tertiary key informants (including pimps, taxi and rickshaw drivers, police officers and non-government organisation workers) to identify locations where FSWs can be found, with a focus on locations where they meet clients. Each city was divided into zones to ensure that key informants provided information for local areas. The number of zones per city was: Karachi (18), Lahore (40), Faisalabad (18), Multan (20), Hyderabad (11), Sukkur (5) and Quetta (6). Typically, 50-150 key informant interviews were conducted in each zone, depending on the size. The identified FSW locations were tabulated on a daily basis and all those mentioned by multiple key informants and/or those where a key informant indicated that a large population of FSWs could be found were identified for a second level of data collection which occurred at the location with primary key informants (FSWs at the locations). Level 2 interviews sought detailed information about the specific spots within a location, the number of FSWs who worked at a particular location or spot on a typical day, and the general organisational type of sex work at that location (ie, street-based, brothel-based, homebased). For example, a large train station would be considered a location, but it may have several distinct spots where FSWs can be found (eg, front gate, platform). Level 2 interviews also sought other locations in the vicinity not identified by level 1 key informants. This process of "snowballing" proceeded until location identification became redundant and no new locations were identified. To map brothels, key informant interviews were used to identify the location of brothels, after which a room-to-room "head count" of FSWs working in each brothel was conducted.

Survey methods:

A cross-sectional behaviour survey was conducted between 20 November and 30 December 2005. Based on the results of the mapping study, FSWs were further categorised according to place of operation into: (1) kothikhana-based (similar to a small brothel, this is usually a small apartment where a few FSWs work under a madam); (2) home-based; (3) brothel-based; and (4) public place-based sex workers. Attempts were made to select a representative sample using the following techniques. The mapping results guided the proportionate distribution of the samples according to type of sex work (ie, kothikhana, home, brothel, public places). Brothel-based FSWs were selected through systematic random sampling (ie, systematic sampling from a list of FSWs using a random start), public place-based FSWs through multistage time-location cluster sampling, and kothikhana/home-based FSWs through respondent-driven sampling. A target sample size of 400 FSWs was set for each city.

Sociodemographic and behavioural data were collected by trained interviewers in face-to-face interviews after verbally obtaining and attesting to the provision of informed consent. Overall, 2869 FSWs were surveyed across the seven cities, with the smallest sample being 368 from Sukkur. The study methodology was reviewed and approved by the ethical review board of the Public Health Agency of Canada.

Data analysis:

To estimate the total number of sex worker-client encounters by type for each city, the estimated size of each FSW subpopulation based on mapping was multiplied by the monthly average number of clients reported by that subpopulation of FSWs. To illustrate the inequality of distribution of client volume in sex worker populations, we drew Lorenz curves and computed the Gini coefficient.10 The Lorenz curve plots the cumulative proportion of all client contacts accounted for by each FSW, ordering sex workers sequentially by their number of monthly clients. If clients are distributed equally, then each FSW accounts for the same proportion of clients and the plot is diagonal. Deviation from the diagonal indicates inequality in the distribution of client contacts. The Gini coefficient is a numeric summary of this deviation equal

to twice the total area between the equality diagonal and the Lorenz curve. A more skewed Lorenz curve and a higher Gini coefficient indicate greater inequality in client distribution among FSWs.

Results

FSW population and characteristics:

There were an estimated 34 480 FSWs in the seven cities, ranging from 760 in Quetta to 14 150 in Lahore. The overall estimated number of FSWs per 1000 adult men was 6.9, ranging from 4.2 per 1000 men in Faisalabad to 11.4 per 1000 men in Lahore. Overall, 57.5% of FSWs worked out of home or kothikhana settings, with just over 40% working from public places and the remaining 2% working out of brothels. The organisational type of sex work differed substantially between the cities. In six of the cities .50% of FSWs worked out of public places, but in Lahore and Quetta most FSWs worked out of homes and kothikhanas (75% and 72%, respectively).

Table-1 shows selected demographic and behavioural characteristics of FSWs by type of sex work. Compared with other types of FSWs, brothel-based sex workers reported significantly lower age at sexual debut, longer duration in sex work and more clients per month. Brothel-based sex workers were less likely to have a non-client sexual partner in the past month and more likely to report condom use in the last vaginal sex act.

Client volume and distribution:

The average monthly client volume and total estimated client volume for FSWs in the seven cities are presented in Table-2. The mean number of clients per FSW varied substantially between cities, ranging from 7.6 per month in Hyderabad to 62.0 per month in Sukkur. Overall, Lahore had the highest monthly volume of FSW-client contacts with an estimated 653 000 encounters per month.

Figure-1 shows the Lorenz curves for the cumulative distribution of client encounters among FSWs in the seven cities and illustrates variations in the distribution of clients among FSWs in the different cities. These differences are summarised numerically in Table-2, which presents the Gini coefficient for each of the cities along with the proportion of client encounters accounted for by the top 20% of FSWs in terms of client volume. Hyderabad, Lahore and Karachi (the three most extreme Lorenz curves in Figure) have the highest Gini coefficients (0.50, 0.47 and 0.45, respectively), indicating the most unequal distribution of client volume. The top 20% of FSWs in terms of client volume account for 56% of all FSWclient encounters in Hyderabad, 53% in Lahore and

Table-1: Selected characteristics of female sex workers (FSWs) in seven cities of Pakistan in 2005.

	Location of solicitation			
Characteristic	Public places* (n=1194)	Home or kothikhana† (n=1471)	Brothel (n=204)	All FSWs (n=2869)
Mean age at sexual debut (years)	21	22	16	19
Mean years in sex work	5.2	5.6	9.6	6.8
Mean number of clients per day	4.2	6	4	4.6
Mean number of clients in the past month	36	30	42	36
.1 non-client partner last month (%)	17%	15%	11%	14.3%
Condom use in last vaginal sex act (%)	34%	31%	60%	34%

*"Public places" refers to places where FSWs encounter and/or solicit clients and includes open areas such as along streets, at intersections and in public venues such as bus and train stations.
†"Kothikhana" is a term used for a small home or apartment which is rented by a madam for a period of time for sex work. Two or more FSWs live and work in a kothikhana at any given time.

Table-2: Distribution of client volume among female sex workers (FSWs) in seven cities of Pakistan in 2005.

City	Mean number of clients per FSW per month	Total monthly client volume	Percentage of encounters among the top 20% of FSWs (%)	Gini coefficient
Hyderabad	7.6	13000	56	0.50
Lahore	46.1	653000	53	0.47
Karachi	19.0	219000	49	0.45
Quetta	44.0	33000	39	0.35
Sukkur	62.0	107000	37	0.32
Multan	41.9	107000	32	0.22
Faisalabad	15.3	31000	32	0.22

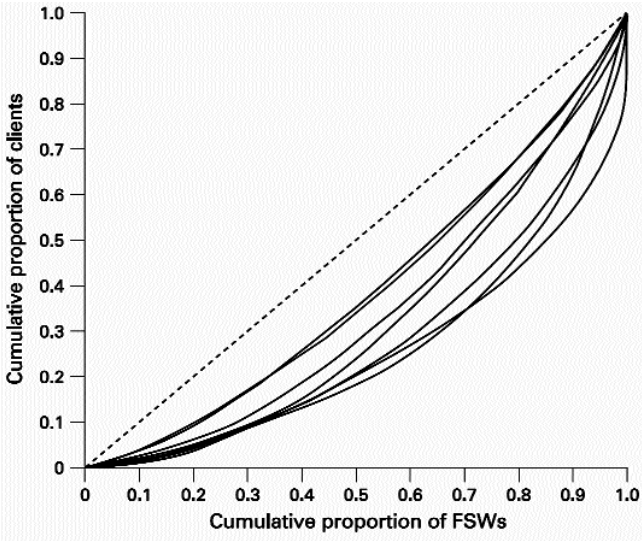

Figure: Lorenz curves showing the distribution of client encounters among female sex workers (FSWs) in seven cities of Pakistan, 2005.

49% in Karachi. At the other end of the spectrum, Faisalabad and Multan each had a Gini coefficient of 0.22 and the top 20% of FSWs accounted for only 32% of all encounters.

Discussion

Expanding focused prevention programmes for FSWs is a strategic imperative for controlling the expansion of the HIV epidemic in many countries, including Pakistan.[11] The relative size of FSW populations in these seven cities of Pakistan, although somewhat lower than estimates from other Asian countries,[12,13] is still substantial at almost 7 FSWs per 1000 adult men. More important for transmission dynamics is the size of the bridge population, represented in our analysis by the estimated number of monthly FSW-client encounters. This ranges from 13 000 encounters per month in Hyderabad to more than 650 000 per month in Lahore. This is an order of magnitude higher than the size of the potential bridge population represented by sexual partners of IDUs in these cities. These data also help to identify the highest priority cities for FSW interventions, with Lahore, Karachi, Sukkur and Multan showing the most epidemic potential based on the size of the FSW and bridge populations.

The varied distribution of sex work has implications for the design of targeted programmes for FSWs. In cities where a significant proportion of sex workers operate from public places (eg, Karachi), programmes will have to emphasise peer outreach and appropriate clinical services. In cities where most sex work is concentrated in homes and small venues such as kothikhanas (eg, Lahore and Quetta), alternative strategies will need to be employed which involve network operators and madams to facilitate outreach and service provision.

In this paper we have developed empirical measures to describe another important aspect of sex work: the client volume distribution among FSWs. Our data indicate that there are substantial differences in client-sex worker contact patterns in this regard. Whereas some cities display a relatively even distribution of clients among sex workers (eg, Faisalabad and Multan), others show a highly skewed distribution (eg, Hyderabad, Lahore and Karachi). In those cities where client volume is highly clustered, prevention programmes could potentially have a disproportionately large effect by focusing on the subset of FSWs with high client volumes. Differential patterns of client-FSW contact might also have implications for transmission dynamics. A modelling study by Ghani and Aral showed that a tendency towards client clustering could reduce the overall prevalence of both gonorrhoea and herpes simplex virus-2 among FSWs and their clients, particularly if clients tend to visit the same FSWs repeatedly.[8]

We acknowledge that there are limitations and potential biases in our study. First, the mapping was done largely in the context of limited prevention programmes and the comprehensiveness of the mapping cannot be assured. However, since the same methodology was applied to all cities, we believe that some of the large variations in FSW populations between cities represent true differences. Similarly, the accuracy of selfreported information on client volume is uncertain. However, as with our mapping results, the use of a consistent methodology in all cities increases our confidence in the veracity of large differences between cities. Notwithstanding potential biases in the data, we believe that our analytical approach holds some promise for future surveillance and research in this area. There are only scant primary data on the absolute and relative sizes of FSW populations[12] and we

Key messages

- A two-stage process was used to describe the size and distribution of female sex worker (FSW) populations and the distribution of client-FSW encounters in seven major cities of Pakistan.
- The relative size and distribution of sex workers and the sex worker-client patterns differs considerably in cities of Pakistan. Programmes should be planned and implemented accordingly.
- Expanding focused prevention programmes for FSWs is a strategic imperative for controlling the expansion of the HIV epidemic in many countries, including Pakistan.

think that this is an important information deficit. In addition, we would urge a broader approach to the analysis of mapping and behavioural data to include more detailed assessments of client-FSW contact patterns. Such empirical data are needed to understand better and model HIV transmission dynamics and perhaps, more importantly, they are crucial to help guide the design and implementation of effective prevention programmes.

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Competing interests:

None.

JFB was the overall project coordinator and lead author of the study. AK and AB provided data interpretation and manuscript review and revision.

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