

## Supplementary Online Material

### Methods

#### *Components of the Avahan intervention*

The *Avahan* intervention comprises six programmatic areas<sup>1</sup>: 1) peer outreach, community mobilization, and local advocacy for HIV vulnerability reduction; 2) advocacy for an enabling environment; 3) communication for behaviour change; 4) clinical prevention services, including clinical management of sexually transmitted infections (STIs), and prevention commodity availability (condoms, needles and syringes); 5) monitoring for data-informed program management; and 6) proactive program management.

#### *Study population and data collection for variables at the individual level*

The design and study procedures of the cross-sectional studies, known as integrated behavioural and biological assessments (IBBAs), have been described in detail elsewhere.<sup>2,3</sup> Briefly, random samples of FSWs (defined as women aged 18 years or older who had exchanged sex for money at least once in the past one month) were selected in each of the 24 target districts. The rationale for district selection has been described extensively by Saidel et al,<sup>3</sup> with standard cluster sampling, time-location cluster sampling or respondent-driven sampling used for FSW selection, depending on the local sex work typology (multiple sampling methods could be used within the same district). The target sample size for each district in each round was 400, except for large cities such as Bangalore (Karnataka state) and Thane (Maharashtra state), where it was 800, and Mumbai (the largest city in India), where it was 1200.

Women were approached at sex work venues by trained interviewers with the help of community guides. A questionnaire was administered in the field in the local language, and included questions on socio-demographic characteristics and sexual behaviour with clients and other sexual partners (including condom use). Then, blood and urine samples were collected for HIV, syphilis, *Neisseria gonorrhoeae* and *Chlamydia trachomatis* testing. Laboratory testing used previously described validated serological

methods for HIV and syphilis and nucleic acid amplification methods for *N. gonorrhoeae* and *C. trachomatis*.<sup>2,3</sup>

#### *District-specific program and contextual variables*

The common set of program indicators for all districts covered by *Avahan* has been described extensively elsewhere.<sup>4</sup> For the purpose of the present analysis, we used data collected by the NGOs implementing the intervention in each district on: 1) the number of FSWs ever contacted by the program in a given year; 2) the number of FSWs contacted monthly; and 3) the number of condoms distributed to FSWs by the NGO in a given year. These figures were converted into proportions by dividing them by the estimated number of FSWs in the district (population size estimates are arrived at using various methods and are updated on a regular basis<sup>4</sup>) for indicators 1 and 2. This resulted in: 1) estimation of program coverage; and 2) estimation of the proportion of FSWs contacted monthly. The condom figures were divided by the expected number of condoms needed by FSWs in the district, based on the estimated number of FSWs in the district and the mean number of client-contacts estimated from the IBBA data. This resulted in an estimate of the proportion of condom requirement met. The three indicators were computed for years 2006 to 2008, as the information was complete for all districts only for that time period (the program started being handed over to the government in 2008). In the statistical models, we used the 2006 values of the indicators and the difference between the 2008 and 2006 values.

We considered a total of 53 district-level contextual variables for inclusion in the multi-level statistical model (see complete list in the Supplementary Online Material Table). They were collected from multiple official/government sources for all 24 districts. The nature of these variables are mainly socio-demographic (for example: mean age at marriage by sex, sex ratio, migration) or economic (for example: per capita income, number of truck halt points).

### *Ethical considerations*

Only women aged 18 years or more were recruited in the study. The surveys were conducted anonymously, with no names or personal identifiers recorded. Consent was obtained separately for the interview and for giving biological samples. Participants' consent was provided in writing, either by themselves, or for illiterate participants, by an independent witness who confirmed that verbal consent was provided.

The study and its consent procedures were approved by the ethics committees of: the National AIDS Research Institute, Pune, the National Institute of Epidemiology, Chennai, the National Institute of Nutrition, Hyderabad, and St. John's Medical College and Hospital, Bangalore, India, as well as Family Health International, Arlington, VA, USA, and the University of Manitoba, Winnipeg, Canada. Finally, statutory approval for the conduct of the IBBA and its protocols was obtained from the Government of India's Health Ministry Screening Committee (HMSC).

### **References**

- <sup>1</sup> Avahan Common Minimum Program for HIV Prevention in India. New Delhi, India: Bill & Melinda Gates Foundation; 2010, <http://www.gatesfoundation.org/avahan/Documents/cmp-monograph.pdf> Accessed December 5, 2012.
- <sup>2</sup> Ramesh BM, Moses S, Washington R, Isac S, Mohapatra B, Mahagaonkar SB, Adhikary R, Brahman GN, Paranjape RS, Subramanian T, Blanchard JF. Determinants of HIV prevalence among female sex workers in four south Indian states: analysis of cross-sectional surveys in twenty-three districts. *AIDS*. 2008;**22 (Suppl 5)**:S35-44.
- <sup>3</sup> Saidel T, Adhikary R, Mainkar M, Dale J, Loo V, Rahman M, Ramesh BM, Paranjape RS. Baseline integrated behavioural and biological assessment among most at-risk populations in six high-prevalence states of India: design and implementation challenges. *AIDS*. 2008;**22 (Suppl 5)**:S17-34.

- <sup>4</sup> Verma R, Shekhar A, Khobragade S, Adhikary R, George B, Ramesh BM, Ranebennur V, Mondal S, Patra RK, Srinivasan S, Vijayaraman A, Paul SR, Bohidar N. Scale-up and coverage of Avahan: a large-scale HIV-prevention programme among female sex workers and men who have sex with men in four Indian states. *Sex Transm Infect.* 2010;**86 (Suppl 1)**:i76-82.