

Editorial

The Integrated Behavioural & Biological Assessments - Tool for analysis & evaluation of trends in HIV epidemic

As a part of overall strategy for reducing the burden of HIV infection in the country the Bill and Melinda Gates Foundation (BMGF) initiated in 2005 “*Avahan*”, a large scale HIV prevention intervention programme among high risk population groups across six high prevalence States in India. The programme was designed to deliver high intensity peer mediated outreach for bringing about behaviour change in condom use, and management of sexually transmitted infections (STIs) among the high risk groups¹.

Integrated Behavioural and Biological Assessment (IBBA) surveys were conducted in select districts using probability based sampling as a part of an ambitious programme for evaluation of the impact of “*Avahan*” interventions². The main objectives of the IBBA were to provide data to measure the outcomes of the *Avahan* programme across the high prevalence states and to provide data for modeling the impact of the epidemic³. Two rounds of IBBA (2006-2007 and 2009-2010) have been conducted in 29 districts, covering female sex workers (FSWs), men who have sex with men (MSM), transgender, clients of FSWs, injecting drug users (IDUs) and long distance truck drivers⁴.

IBBA was one of largest exercises of conducting surveys using probability based sampling methods among the populations that are vulnerable and disadvantaged due to the stigma attached to the risk behaviour. The surveys involved multi-level co-ordination between government and non-government agencies, extensive logistic arrangements for biological sample collection, transportation and testing, data management and dissemination of findings⁵. Quality control for biological testing and data entry and management were scrupulously observed. The surveys were carried out with different strategies in place for reduction of survey related harm to study participants.

The salient findings from the surveys included evidence for increased coverage by intervention programmes between first round and the second round of survey, increase in condom use with the commercial partners and decline in prevalence of HIV and sexually transmitted infections (STIs) especially among FSWs, in majority of the districts surveyed⁴. Though there was an overall decline in HIV prevalence, there was sustained or increased HIV prevalence seen in some high risk populations in a few districts.

Analysis of bio-behavioural indicators among FSWs in districts from southern States have demonstrated an increase in the consistent condom use along with decrease in STIs among FSWs⁶⁻⁸. The increase in safer sexual practices was more among those exposed to *Avahan* interventions. These findings are consistent with the findings from other impact assessment surveys from India^{9,10}. Similar decline was not seen among the sex workers in Dimapur district of Nagaland, where commercial sex and injecting drug use are drivers of HIV epidemic¹⁰. In addition, the data indicated that sexual transmissibility of HCV among FSWs poses high risk to the community¹¹.

While there was overall downtrend of risk behaviour and HIV/STI prevalence among FSWs in the southern States, the findings among IDUs in the North Eastern States were not so promising. One of the indicators for programme coverage was proportion of participants who have undergone HIV testing earlier. The analysis of correlates of ever undergone HIV testing underscored the need to specially target the illiterates/less educated, young, unmarried IDUs to increase the uptake of HIV testing among IDUs¹³. The surveys also reported relatively low level of HIV prevalence in long distance truckers and contrary to general belief low level of MSM activity among truckers¹⁴.

This survey involved about 25000 participants in each of the two rounds and generated vast amount of data on behavioural and biological indicators. The findings of the survey were shared with the “*Avahan*” programme as well as National AIDS Control Programme. Thirty five peer reviewed papers have already been published based on the analysis of the IBBA data in leading international journals. The Indian Council of Medical Research, Family Health International (FHI) 360 and BMGF have taken progressive step and made the IBBA raw data accessible to the scientific community, policy makers and others who wish to conduct secondary analysis using the data. A website has been developed (www.ibbainfo.org) which provides all the detailed methodologies of IBBA, access to tools, guidelines, manuals, and links to the ICMR - NARI site from where the IBBA data can be sourced.

IBBA also provided an opportunity to implement respondent driven sampling (RDS) method in diverse settings like Mumbai and North Eastern States. The experiences from the application of IBBA in Mumbai-Thane and North Eastern States of Nagaland and Manipur are shared in this issue¹⁴. The lessons learnt in these surveys would be useful for future application of this innovative sampling methodology for survey of hidden or difficult to access populations. With the HIV epidemic still spreading among IDUs and MSM, both hard to reach populations, RDS may prove to be a valuable tool, both for survey and interventions.

IBBA, a large dataset has offered options to use different new strategies in secondary analysis of the data. Two new analytical strategies were applied for analyzing the IBBA data and presented in this issue¹⁶⁻¹⁸.

Geographic Information System (GIS) technology is a tracking tool, which enables us to analyze the geographic spread of the disease. Kriging technique is a geostatistical prediction, initially an earth science technique based on regionalized variable theory. Weights are given using the method of least squares or inverse distance; it provides a means of interpolating values for points not physically sampled using the available information and the spatial arrangement of the data set. Slowly it has gained importance in health science research and numerous reports/studies are available on a continuum of diseases. On the other hand, it has been scarcely applied in research on HIV disease. The kriging technique helps to visualize disease patterns and to identify the regions at greater risk of higher disease prevalence with the available information. The article in this issue presents analysis using kriging technique which depicts the regional

variation and the HIV/STI high risk concentrated regions (hot spots), and regions at the greater risk of HIV infections¹⁶.

In India we have HIV Spatial Data Repository at the macro level (State level) which provides geographically-linked HIV-related data for mapping. This would not augment to build complex spatial models. However, social stigma attached to the disclosure of the micro level data (individual level) remains to be an obstacle to build models. The alternative for confidential data would be geo-masking (shifting the origin of location) the data set. The detailed information available about the sampling strategy of IBBA paved a way to geocode the subjects to the nearest best (approximately) and build a spatial model to identify the risk factors of HIV infection. The analysis proved the importance of the spatial indicators to understand the geography of the spread of infection. If the exact location of information was available (geo-masked) one could pinpoint the region at the greater risk of HIV infection and it would have been more time effective.

Overall, IBBA has provided valuable data source that can be used for HIV programmes. Successful conduct of two rounds of IBBA demonstrated that conducting such complicated and logistically challenging surveys among marginalized and high risk populations is possible with proper planning and co-ordination. It has also provided opportunity for gaining experience about new methodologies such as RDS, and provided opportunity to apply of GIS and tracking tool, kriging technique, *etc.* for studying HIV epidemiology. Continuing access to the IBBA data has kept open the possibility of learning further from this valuable dataset.

IBBA data has significantly contributed to increasing the quantum of scientific peer reviewed publications from India on HIV epidemiology in the context of concentrated epidemics and focusing on better understanding of risk behaviours of high risk groups. Given the IBBA scope and availability of raw data, more research can be taken up for gaining additional insights on methodological issues and epidemiology of HIV among high risk groups in India.

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