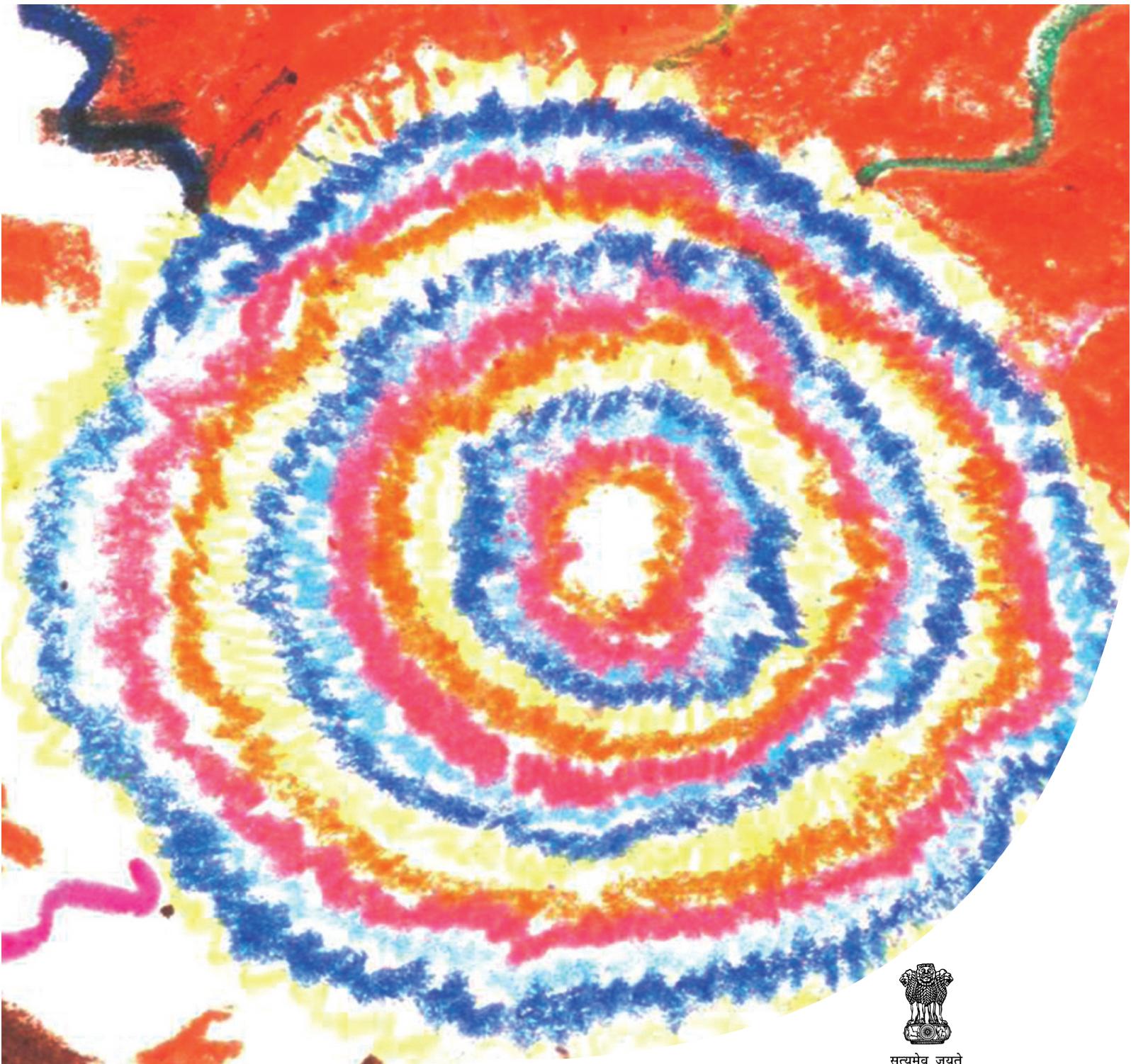


NATIONAL CONFERENCE ON HIV/AIDS RESEARCH

Towards Evidence-Policy linkages in HIV/AIDS Research in India



सत्यमेव जयते



ABSTRACT BOOK
January 19 - 21, 2011

National AIDS Control Organisation

India's voice against AIDS
Department of AIDS Control

Ministry of Health & Family Welfare, Government of India.
www.nacoindia.org

Venue : India Habitat Centre,
New Delhi



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Index

Foreword

Acknowledgements

Invited presentations

1. Heading towards the Safer Highways in India:
Experiences from Two Rounds of Integrated Behavioural and
Biological Assessment along National Highways 01
2. Epidemiological Profiling of HIV/AIDS Situation at
District & Sub-district Level Using Data Triangulation
– Conceptual Framework 03

Oral Presentations

1. Clinical and Biomedical Studies 08
2. Basic Sciences 23
3. Socio-Behavioral Studies 29
4. Evaluation Studies 41

Poster Presentations

1. Clinical and Biomedical Studies 59
2. Basic Sciences 87
3. Socio-Behavioral Studies 93
4. Evaluation Studies 127

Annex 1: List of Abstracts selected for Oral Presentation 154

Annex 2: List of Abstracts selected for Poster Presentation 156



Sayan Chatterjee

Secretary & Director General

Department of AIDS Control, NACO, Ministry of Health and Family Welfare, Government of India



FOREWORD

The National AIDS Control Programme strongly endorses the need for extensive exchange of knowledge among the researchers, programme managers and policy makers to more effectively identify, plan / design and implement appropriate strategies for effective prevention and control of HIV epidemic in India.

The National Conference on HIV/AIDS Research has been conceived with the objective of providing evidence for programme planning and policy formulation, besides serving as a National platform for exchange of views, ideas and learnings for the researchers, programme managers and policy makers in India. It is envisaged that this scientific gathering would lead to timely and appropriate National response to the HIV epidemic and planning for the next phase of National AIDS Control Programme.

The importance of research aimed at generating evidence needed for the formulation of policies cannot be over-emphasized and most developed countries depend on results of research findings for the development and implementation of health policies. The gap between the generation and use of research evidence to inform and influence policy makers to make evidence-based policy decisions poses a significant barrier. In most cases, the problems arise due to lack of communication between the researchers and policy makers on one hand, and understanding the need to use research findings by policy makers on the other. It is therefore pertinent that for policies to become evidence-based, a common forum has to be created for interaction between researchers and policy makers. This Conference aims to integrate and link preventive and therapeutic research on HIV /AIDS with the national programme. The theme of Conference for 2011 has therefore been aptly selected as "**Towards Evidence-Policy linkages in HIV/AIDS Research in India.**"

This Book of Abstracts represents the current state of information and knowledge in HIV/AIDS Research in India. It will remain a valuable reference resource for future use for researchers and academicians, as well as policy makers and programme managers.


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अपनी एचआईवी अवस्था जाने, निकटतम सरकारी अस्पताल में मुफ्त सलाह व जाँच पाएँ

Know Your HIV status, go to the nearest Government Hospital for free Voluntary Counselling and Testing

ACKNOWLEDGEMENTS

This Book of Abstracts contains the abstracts of papers that were selected for presentation at the National Conference of HIV/AIDS Research. It represents the collective endeavor of many researchers, field investigators, scholars and others interested in HIV/AIDS research around the country. Except for the abstracts of invited presentations included in the beginning of the book, all were voluntary submissions for oral or poster sessions.

In preparation for the Conference, we sent out a call for abstracts. The response vastly exceeded our expectations: we received more than 350 voluntary submissions from across the country. We sincerely thank all the authors; but for their cooperation and timely inputs, this publication would not have been possible.

Four groups of experts, then, assessed the abstracts in an unbiased scientific manner. For this purpose, well-defined selection criteria were formulated, such as relevance to the programme, innovativeness and methodology. The Organising Committee gratefully acknowledges the excellent work done by these experts: Dr DCS Reddy, Dr Arvind Pandey, Dr Arvind Rai, Dr Shashi Kant, Dr BB Rewari, Dr Ravindra Rao, Dr Partha Haldar and Mr D Dhanikachalam, who had the arduous task of going through the submitted abstracts.

Once the programme was finalised, it was an equally laborious task for the Organising Committee to compile this Book of Abstracts. It involved the efforts of a number of individuals, in particular, my sincere appreciation for my colleagues, Dr. Anshu Mittal (Programme Officer) and Ms. Gunjika Mishra (Technical Officer) who handled effectively and tirelessly the myriad logistics and communication associated with the compiling of this Book, including the editing of the final abstracts for technical language, length content and style. They also developed the scientific programme and coordinated the organisation of the conference.

I wish to express my heartfelt thanks to our collaborators, UNAIDS who provided financial and logistical support for the National Conference on HIV/AIDS Research. Dr. Charles Gilks, Country Coordinator, Mr. Taoufik Bakkali, Senior M&E Advisor and Ms. Nalini Chandra, Programme Officer supported the organisation of the Conference.

The book has been posted on the NACO Web-site www.nacoonline.org for wider access and dissemination. We trust it will be useful as a source of information for researchers and academicians, as well as policy makers and programme managers. It is proposed to follow up the Conference by bringing out a compilation of the presented papers.

The National AIDS Control Organisation is pleased to extend the warmest welcome to all attendees and wishes them a scientifically fruitful Conference.

Dr. S. Venkatesh
Deputy Director General (M&E)
National AIDS Control Organisation
on behalf of Conference Committee

EDITOR'S NOTE

This Book of Abstracts contains two sections, the abstracts of some of the invited presentations and the selected submitted abstracts. The submitted abstracts are ordered by the four Themes of the Conference, namely, Clinical & Biomedical, Basic Sciences, Socio-behavioural and Evaluation & Operations Research Studies. Within the themes, they are divided between oral and poster presentations.

The selected abstracts were edited for uniformity in length, presentation format and language. The abstracts that were too long were abbreviated and we also took the liberty of removing tables, figures etc. to keep the book within limits. All the authors were given the opportunity to submit revised and updated abstracts. The list of abstracts mentions the names of the presenting authors/first author (where the presenting author was not confirmed).

This Book reflects the abstracts at the time of going to the press.

Heading towards the Safer Highways in India: Experiences from Two Rounds of Integrated Behavioural and Biological Assessment along National Highways

Speaker: Arvind Pandey

Background: Avahan, the India AIDS Initiative started in India in 2004 with the aim of slowing down the HIV epidemic through focused, integrated, large-scale prevention programs to key populations including long distance truck drivers. As a part of the overall strategy to evaluate these interventions among truckers two rounds of large scale surveys known as Integrated Behavioral and Biological Assessment on National Highways (IBBA-NH) were conducted in 2007 and 2009 respectively.

Objectives: To assess the impact of Avahan intervention on risky sexual practices among long distance truck drivers in India.

Methods: Data from the two rounds of IBBA-NH will be used. The paper aims to examine whether the observed changes in the risk behavior of long distance truck drivers are due to the cumulative effects of other intervention programs undertaken among truckers and general awareness in Indian masses about the HIV/AIDS epidemic. This would be achieved by examining the pattern of risk behavior with the type of exposure (Avahan/non-avahan) and its duration among truckers. Further, the paper will also attempt to adjust the impact of the Avahan programs by addressing the fact that the intervention programs did not approach the target population in a randomized manner. Rather, those who had higher-risk behavior also had higher chances of getting the exposure to the program. Multivariate regressions and propensity scores would be used to examine the confounding effect of 'non-random' exposure to the intervention program.

Results: A total of 2066 and 2085 respondents were covered the two rounds of IBBA-NH respectively. The results show that overall the risk behaviour among truckers has reduced over time. Though percentage of truckers frequenting female sex workers (FSWs) remained almost same (more than 25%) in the two rounds of survey, the

consistent condom use with FSWs has improved (Round 1: 71%; Round 2: 77%). The likelihood of using condom consistently with non-paid female partners has increased significantly (Round 1: 29%, Round-2: 47%; AOR 2.4, p 0.02). Moreover, the probability of having HIV (AOR 0.5, p <0.001) and active syphilis (AOR 0.5, p 0.09) has also declined significantly. Interestingly, Round 1 data shows that larger percentage (35%) of truckers who availed services from Avahan interventions visited FSWs than those who were not exposed to the program (28%). Similarly, data from the first round of the survey also show that a lower proportion (63%) of truckers exposed to Avahan used condom consistently with FSWs than those who were not exposed (74%). Though statistically insignificant, these differences suggest towards 'non-random' coverage of truckers under the program. Moreover, the risk behavior improved considerably with increasing duration of the exposure.

Epidemiological Profiling of HIV/AIDS Situation at District & Sub-district Level Using Data Triangulation – Conceptual Framework

Speaker: Yujwal Raj

Background: Besides a robust & expanded HIV Sentinel Surveillance system, monthly reporting from over 10,000 programme units, mapping & size estimations, behavioural surveys as well as several studies, research projects and evaluations are generating rich evidence base on HIV/AIDS under National AIDS Control Programme. The district level focus of the programme demands information that helps to understand HIV/AIDS scenario in each district, understand reasons for different scenarios in different districts and the role of contextual factors, identify districts for priority attention and identify Programme Areas that need focus within a district. During the first half of NACP-III, greater information has become available for substantial number of districts in the country. In this context of increased availability of data and requirements of decentralized planning at the district level, NACO has undertaken a project titled "Epidemiological Profiling of HIV/AIDS Situation at District and Sub-district Level using Data Triangulation" in 25 states (567 districts) in two phases during 2009 & 2010.

Objectives: Broad objective of the project is to consolidate HIV/AIDS scenario (epidemiological profile and programme response) at district & sub-district level for effective planning and implementation of response.

Specific objectives include:

- Identifying districts and focus areas within a district for priority attention in the Program
- Resource & information collection in a systematic manner to understand the epidemic and response gaps in the district and facilitate evidence-based planning at district & state level
- Capacity building of district & state programme managers and M&E personnel in data analyses, triangulation and use of data for planning & program review

Concept of Data Triangulation: Data Triangulation is an **Analytical Approach** that synthesizes data from multiple sources, to improve the understanding of a public health issue and guide programmatic decision-making to address the issue. By putting different bits of information from different sources into a meaningful framework, it explains and improves the understanding of HIV/AIDS scenario in the district. By providing answers to vital programme questions, it helps in taking effective decisions for planning and implementation of HIV prevention & control efforts. It helps understand the gap between need and programme response and also helps identify the information gaps that hinder effective planning.

The basic principle of Data Triangulation is “To analyse and interpret a dataset in the light of information emerging from other datasets, so that the synthesis offers a better understanding of the issues than what will be inferred from a single dataset.” Triangulation involves **compilation, examination, comparison and collective interpretation** of data from multiple data sources, followed by **reasonable explanation** of facts pertaining to the issue under consideration. The explanation is aimed towards developing a comprehensive picture of the issue, building an epidemiological framework that depicts the possible interplay among various factors and answering some pre-specified questions. Key features of the process of Data Triangulation are that, it

1. Gives importance to every bit of information
2. Gives high importance to quality analysis of data and undertakes thorough quality checks and validation
3. Helps overcome limitations and biases inherent in each dataset
4. Adds value to each dataset and improves their utility
5. Indicates the level of reliability in any inference or conclusion

Framework of District Epidemiological Profiling (DEP): DEP has two broad components – Descriptive Analysis and Triangulation. While descriptive analysis is guided by thematic areas/themes, triangulation is guided by questions. While the former describes the 'what, who, when & where' of the HIV epidemic, the latter explains the 'how and why' of it. **Descriptive analysis** of different datasets is organized into the following four thematic areas/themes.

1. Current state of HIV epidemic (Levels, Trends, Differentials & Burden of HIV; Profile of PLHA)

2. Drivers of Epidemic (Size & profile of risk groups; Vulnerabilities – STIs, Risk Behaviours, Migration, Contextual factors/Regional vulnerabilities)
3. Programme Response & Gaps
4. Information Gaps

Triangulation of the following three data elements helps explain the inferences arrived at in the descriptive analysis and provide answers to the programmatic questions.

1. Information on HIV and STIs in Different Population Groups (Epidemiological data)
2. Information on Vulnerabilities (Mapping & Behavioural data on Risk Groups, District Vulnerabilities)
3. Information on Programme Response (Programme data)

Triangulation may be of information on same data element from different data sources or of information on different data elements. Triangulation may be done in time plane or geographical plane.

Process of District Epidemiological Profiling: The process starts with identifying a broad set of important, actionable and appropriate questions that the programme wants to find answers to, in a given region, and revisits and refines the questions at every step of the process. The process of DEP has the following steps:

Step 1: Understanding Thematic Areas & Questions for District Profiling & Triangulation

Step 2: Review of Data Sources and Assessment of Data Availability in the District

Step 3: Decision on Themes to be described and Questions to be answered for the district

Step 4: Compilation of Secondary Data

Step 5: Quality Check for Completeness, Correctness and Consistency

Step 6: Data Validation, Adjustments & Filling Data Gaps

Step 7: Preparation of Data Tables with clean data for analysis

Step 8: Data Analysis, Interpretation and Inferences; Describe Thematic Areas

Step 9: Data Triangulation (Hypotheses Building; Answer Triangulation Questions)

Step 10: Preparation of District and State Reports

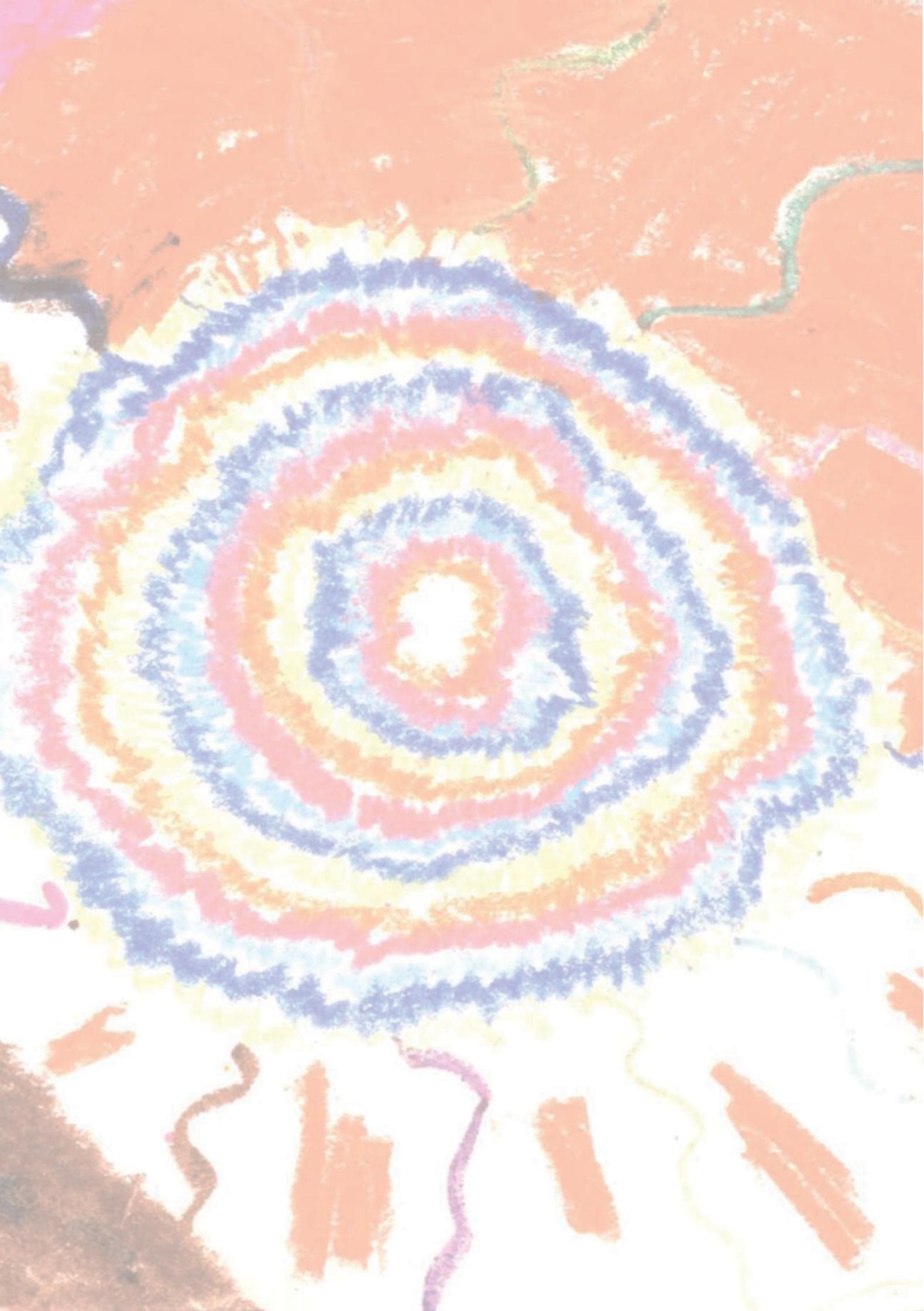
Step 11: Discussions & Consultation with SACS, Local experts, District level programme managers and service delivery functionaries on draft reports

Step 12: Presentation and Discussion of Draft Reports with National Technical Team

Step 13: Finalisation of District and State Reports

Important Outcomes of District Epidemiological Profiling may be summarized as below.

1. Cleaning up & validation of Programme data since 2004
2. Systematic compilation of all the data related to HIV for each district at one place for routine use
3. District Reports describing the profile of HIV epidemic and programme response in each district
4. Development of Framework for Re-prioritisation of districts under the programme
5. Prioritisation extended upto sub-district/block level with high priority blocks identified
6. Identification of Information Gaps at district and state level for planning Strategic Information Activities
7. Capacity building of district level programme managers and staff of service delivery units in handling and analyzing data, enabling them to understand the importance of the data they generate and the need for ensuring its quality, and appreciate the use of data for programme review, decision-making and effecting improvements.
8. Enhanced understanding among the programme managers of HIV epidemic and response in the state and different districts
9. Better use of data in developing District & State Annual Action Plans
10. Institutional Strengthening (building state level resource pools) and fostering linkages between programme units and academic institutions for addressing Strategic Information needs in the programme





“No one should discriminate against HIV
affected women and children.”

Smt. Pratibha Devisingh Patil,
President of India

Presenting Author	Tripathy S
Title of the Presentation	Study to determine the onset of NVP related anti-HIV Drug Resistance mutations at 2-4 months, 6-8 months and 10-14 months following administration of single dose Nevirapine given to HIV infected mother to prevent transmission of HIV to the infant

Tripathy S.

Data was available from 99 mothers for whom single dose nevirapine was administered to prevent mother to child transmission of HIV. Some of the mother's samples were collected at multiple time points (at time of delivery, 2 months, 4 months, 6 months and 12 months after SD NVP was given). Samples were collected at JJ Hospital (Mumbai), NARI (Pune) and at MGR University (Chennai)

Resistance mutations detected:

Time of blood collection	Total number tested	NVP mutations found (#)
Before delivery	27	None
At time of delivery	35	K103N
7-10 days after delivery/SD NVP	30	K103N
6-8 weeks after delivery/SD NVP	45	K103N (5), Y181C (2)
4 months after delivery/ SD NVP	31	K103N (1), Y188C (1)
6 months after delivery/SD NVP	37	K103N (2)
12 months after delivery/SD NVP	41	K103N (1)

Conclusion: The time period when the maximum number of drug resistance mutations to NVP was observed was at 6 to 8 weeks after the SD NVP was administered to the mother at the time of delivery. Subsequently, the number of mutations observed was reduced.

Presenting Author	Tripathy S
Title of the Presentation	Response to treatment with Nevirapine based versus Efavirenz based antiretroviral therapy regimens in ART naïve HIV infected patients with active Tuberculosis in Pune, India

Tripathy S, Gangakhedkar R, Gaikwad N, Pawar J, Thakar M., Jadhav S, Jawalge R, Gaikwad S, Totawar P, Gaikwad A, Khilare R, Iyer RR, Satane, Paranjape RS.

Background: This study has been funded by NACO and is carried out at two sites: one at AIIMS in Delhi and the other at NARI in Pune. The results given below have been obtained from the study subjects enrolled at NARI in Pune. This study has been carried out at Talera Hospital, YCM Hospital. Aundh Chest Hospital and at Kotnis Hospital in Pune and PCMC area around Pune.

Aims and Objectives:

1. To compare clinical, virological and immunological responses to NVP based and EFV based ART regimens in patients with HIV and Tuberculosis infection
2. To determine the safety of Nevirapine based and Efavirenz based highly active antiretroviral therapy regimens in antiretroviral-naive patients with HIV and Tuberculosis infection on ATT.
3. To study the response of switching back to Nevirapine based regimen from Efavirenz based regimen once ATT was over
4. To characterize drug-associated toxicities of Nevirapine based and Efavirenz based regimens in HIV and Tuberculosis patients on ATT

Results: Out of 115 enrolled subjects, 81 were male and 34 were female. Of the 115 subjects enrolled in the study, 95 (82.6%) were in the 30 to 49 age group. Of the 115 subjects enrolled, 68 subjects have completed 48 weeks of follow up and are now off study. The follow up of the remaining subjects is ongoing in the study. Majority of the subjects enrolled had extrapulmonary tuberculosis. So far, there have been 8 deaths in the study, of which five deaths have occurred in the NVP arm and three deaths in the

efavirenz arm. There have been seven participants lost to follow up, 2 in the nevirapine arm and 5 in the efavirenz arm. The study is ongoing and is expected to complete the target enrollment of 150 HIV/TB patients by March 2011. CD4 count data is available for 95 participants of which 47 were randomized to EFV arm and 48 were randomized to NVP arm. The response of the CD4 counts at baseline, 8 weeks, 24 weeks, 36 weeks and 48 weeks is given below:

Cd4 response in the EFV arm of study

	baseline CD4 (n=46)	wk 8 CD4 (n=34)	wk 24 CD4 (n=27)	wk 36 CD4 (n=22)	wk 48 CD4 (n=18)
Mean	126.96	239.44	267.41	272.50	383.72
Median	111.50	247.50	266	257.00	346
Std. Deviation	81.50	110.59	118.67	147.84	157.81
Minimum	10	50	69	75	134
Maximum	346	466	515	619	669

CD4 response in the NVP arm of the study

	baseline CD4 (n=48)	wk 8 CD4 (n=37)	wk 24 CD4 (n=36)	wk 36 CD4 (n=34)	wk 48 CD4 (n=25)
Mean	143.29	268.95	300.25	313.74	382.4
Median	129.5	289	290	328	370
Std. Deviation	95.32	111.37	133.19	125.73	151.43
Minimum	22	53	74	102	124
Maximum	569	464	632	665	628

Conclusion: The response of the CD4 count to the ART administered was similar in the two arms.

Presenting Author	Ahmad Hafiz
Title of the Presentation	Study of prevalence and types of baseline HIV drug resistance in the antiretroviral treatment-naïve HIV infected Northern India population

Sinha S, Ahmad H, Kumar N, Dar L, Samantaray JC, Bhargava A, Sharma SK, Mitsuyasu RL, Fahey JL.

Background: The emergence of HIV drug resistance (HIVDR) is inevitable, given HIV's high replication and mutation rates and the necessity for lifelong antiretroviral treatment (ART). Moreover, due to dearth of literature on HIVDR in India and scarcity of information on baseline drug resistance mutations in non subtype B isolates, we structured this study to ascertain the prevalence of primary HIVDR in ART naïve population of northern India.

Methods: In our study conducted at a tertiary care hospital in Delhi, India, 53 seropositive ART-naïve individuals enrolled and subjected to baseline CD4 T cell count and plasma viral load. HIV-1 genotypic drug resistance assay was carried out with reverse transcriptase (RT) and Protease regions of the *pol* gene of HIV-1. The sequences were analyzed by Stanford HIV drug resistance database and mutations were defined as per International AIDS society (IAS) guidelines for HIVDR analysis.

Results: The prevalence of primary HIV drug resistance was 5/53 (9.4%) with Confidence interval (CI)[3.1% - 20.7%]. Four of 53 (7.5%) individuals harbored Nucleoside reverse transcriptase (NRTI) mutation and one subject (1.9%) revealed major Protease Inhibitor (PI) mutation. RT mutations M184V known to confer resistance to lamivudine, V118I along with 69 Insertion complex mutations were detected. The major PI mutation D30 N conferring resistance to nelfinavir was detected in one subject. In addition, accessory and minor PI mutations such as K20R in 4/53 (7.5%), M36I present at the Hinge region of the protease enzyme were seen in 52/53 (98%) and H69K in 26/53 (49 %), L63P, A71E/V, I13V, L10V, K45I/R were also detected in our study. These amino acid substitutions do play a role in the fitness of the subtype C protease.

Conclusions: Hence, our study reveals that the overall primary drug resistance level is around 10% well above the WHO HIVDR surveillance rate of 5%, necessitating the need for baseline HIV-1 genotyping for better patient care and HIV management.

Presenting Author	Shet A
Title of the Presentation	Suboptimal adherence predicts virologic failure and resistance mutations among patients on first-line HAART in Bangalore, India.

Ekstrand M, Shet A, Chandy S, Singh G, Shyamsundar R, Madhavan V, Saravanan S, Kumarasamy N.

Presented at the International AIDS Conference, Vienna, July 2010.

Background: This study was conducted to examine the relationship between adherence, viral load (VL) and resistance mutations among public and private clinic outpatients receiving first-line HAART in Bangalore, India.

Methods: A total of 552 outpatients receiving HAART were recruited. Viral load (VL) testing was conducted for all patients as part of this study. HIV-1 genotypic resistance testing was performed for n=92 with VL>1000 copies/mL. Interpretation of drug resistance mutations was performed according to the Stanford database (<http://hivdb.stanford.edu/hiv>). Past month adherence and treatment interruptions of >48 hours were assessed via self-report.

Results: 6% (n=34) of participants reported < 95% past month adherence and 20% (n=110) reported a history of >48 hr treatment interruptions. Combining the two adherence measures, 23% (n=123) were classified as “sub optimally-adherent”.

Overall, 24% (n=132) had detectable VL, (median =8,850 c/mL, IQR 1,175-147,688 c/mL). All adherence measures were significantly associated with VL, with 42% of sub optimally-adherent, and 19% of optimally-adherent patients showing virological failure (p<0.0001). Among 92 genotyping samples, 69% (n=63) had one or more NRTI mutations. M184V was the commonest (62%, n=57) and 44% (n=40) had thymidine analogue mutations (TAMS). 72% (n=66) had one or more NNRTI mutations and 23% (n=21) had 3+ NNRTI mutations. Adherence was significantly associated with mutations only when treatment interruptions were included, with 87% of “sub optimally” and 65% of “optimally” adherent patients having mutations (p<.02).

Conclusions: Our findings illustrate for the first time the strong association between suboptimal adherence, treatment failure and worsening drug resistance among patients on first-line HAART in India. The predictive value of standard adherence measures was improved by including data on treatment interruptions. The observed mutations can jeopardize future treatment options, especially in light of limited access to 2nd line treatments. Culturally-appropriate techniques are needed to improve adherence and reduce treatment interruptions in this setting.

Presenting Author	Rajasekaran S
Title of the Presentation	Increase in CD 4 counts between 2 and 3.5 years after initiation of antiretroviral therapy and determinants of CD4 progression in India.

Ekstrand M, Shet A, Chandy S, Singh G, Shyamsundar R, Madhavan V, Saravanan S, Kumarasamy N.

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Presenting Author	Rajasekaran S
Title of the Presentation	Efficacy of antiretroviral therapy program in children in India: prognostic factors and survival analysis

Rajasekaran S, Jeyaseelan L, Ravichandran N, Gomathi C, Thara F, Chandrasekar C

Published in J Trop Pediatr 2009 Aug;55(4):225-32.

The objective of this article is to study the survival pattern and the prognostic factors for HIV-infected children on antiretroviral therapy (ART) for two and half years at the Government Hospital of Thoracic Medicine, Tambaram, Chennai, India.

We studied 295 children who were initiated on ART from 1 April 2004 to 30 September 2006 at a large, public tertiary care facility in Chennai, India. Weight for age Z-score was calculated. Survival curves and Cox proportional hazard models were used to identify risk factors for mortality. The mean and median follow up was 11 and 10 months, respectively.

The cumulative survival probability at 6, 12, 18, 24 and 30 months was 93, 90, 89.7, 89.7 and 89.7%, respectively. Of the children who died, about 50% died within the first month. Nearly 6% of the children had adherence less than 95%. The children who had a baseline CD4 percent less than or equal to 14% had significantly ($p < 0.05$) higher mortality as compared to children who had 20% or more. The children who had negative or no change in weight for age Z-score and hemoglobin had 18.9 (3.7-95.7) times significantly higher mortality as compared to children who had positive change in both variables ($p < 0.001$). The sensitivity, specificity and likelihood ratio of the positive test for negative change or no change in HB was 65%, 85% and 4.3, respectively. Similarly, these were 80%, 73% and 3% for negative or no change in Absolute Lymphocyte Count (ALC).

These findings indicate the feasibility and effectiveness of implementing an ART program in a large government hospital in India. Simple nutritional variable hemoglobin and immunologic variable ALC could be used to monitor the progression of disease in children.

Presenting Author	Rajasekaran S
Title of the Presentation	Post-HAART tuberculosis in adults and adolescents with HIV in India: Incidence, clinical and immunological profile

Rajasekaran S, Raja K, Jeyaseelan L, Vijilat S, Priya K, Mohan K, Parvez A, Mahilmaran A, Chandrasekar C

Published in Indian J Tuberc. 2009 Apr;56(2):69-76.

Background: Highly Active Antiretroviral Therapy (HAART) was introduced in National AIDS Control Programme in 2004 to reduce the morbidity and mortality among those affected with HIV/AIDS. Tuberculosis, being an important co infection, its emergence/occurrence in post-HAART period has potential implications.

Objective: Primary objectives were to study the incidence of post-HAART tuberculosis in HIV patients and to identify the possible risk factors. It was also intended to understand the clinical and immunological profile of this important condition.

Methodology: Eligible adults and adolescents with HIV disease enrolled on HAART at Government Hospital of Thoracic Medicine, Tambaram Sanatorium, Chennai, from April, 2004 to March, 2007, formed the study population. They were monitored and screened for the occurrence of tuberculosis after commencing HAART. Clinical details and immunological profile of these patients were analysed.

Results: Two hundred and sixty-two patients (5.1%) of 5099 patients followed-up for one to four years were found to have Post HAART TB with 100-person year risk of 2.83. Post HAART TB occurred predominantly in men (67.6%) and in 31-44 years age group (69.8%) with 100-person year risk being 3.26 and 2.83 respectively. Pulmonary, Extra-pulmonary and disseminated tuberculosis were found to occur in the frequencies of 78%, 16% and 6% respectively. A total of 144 patients (54.9%) developed tuberculosis within six months and this number increased to 202 (77%) by 12 months. 230 patients (87.7%) had base level CD4 cell count < 200 / mm³.

Conclusion: Tuberculosis was found to occur pre-dominantly in adult male patients with HIV during the first year after the initiation of HAART. Significantly, occurrence of Post HAART TB remained almost the same (5%) among patients treated for TB prior to the initiation of HAART.

Presenting Author	Rajasekaran S
Title of the Presentation	Predictors of failure of first-line antiretroviral therapy in HIV-infected adults: Indian experience

Rajasekaran S, Jeyaseelan L, Vijila S, Gomathi C, Raja K

Published in AIDS, 2007 Jul;21 Suppl 4:S47-53.

Objectives: To study the incidence and risk factors for failure of treatment with antiretroviral therapy among adults in the national treatment program in India, and to estimate the possible number of persons living with human immunodeficiency virus (HIV) who will need a second-line treatment regimen in the next 3 and 3.5 years.

Design and Settings: Data of a cohort of HIV-positive adult patients, who were enrolled in the government-sponsored antiretroviral therapy program, were obtained from the electronic medical record system of the largest HIV care center in India and subjected to analysis.

Main outcomes: Treatment failure defined by the World Health Organization criteria, assessed immunologically on the basis of CD4 T cell count, with a minimum period of 12 months of follow-up and with a minimum of two CD4 T cell follow-up measures.

Results: The cumulative incidence of treatment failure in the 1370 adult patients included in the study was 3.9% (95% confidence interval [CI] 2.9 to 4.9). Men had a 3.5 (1.6 to 7.4) times significantly greater risk of treatment failure. Patients who had negative changes in absolute lymphocyte count, hemoglobin concentration and body weight had 3.1 (1.6 to 6.2), 3.2 (1.6 to 6.2), and 3.5 (1.9 to 6.4) times significantly greater risk of treatment failure. In India, after 2007, by 2, 3, and 3.5 years, respectively, an estimated 16 000, 35 000, and 51 000 patients receiving antiretroviral therapy are likely to require second-line treatment.

Conclusion: Monitoring of hemoglobin concentration, absolute lymphocyte count, and body weight during follow-up emerged as inexpensive predictors of treatment failure in a resource-poor setting. A significant number of patients will need second-line therapy as a result of failure of their first-line antiretroviral therapy regimen in 3 and 3.5 years in India, and therefore the development of an appropriate policy for second-line drugs is urgently needed.

Presenting Author	Bhawani PK
Title of the Presentation	Long term follow up of HIV-infected patients with tuberculosis treated with 6-month intermittent short course chemotherapy

Swaminathan S, Deivanayagam CN, Rajasekaran S, Venkatesan P, Padmapriyadarsini C, Menon PA, Ponnuraja C, Dilip M

Background: Tuberculosis occurs in 60%-70% of HIV-positive persons in India. The outcome of HIV-positive patients treated with 6-month intermittent short course anti tuberculosis regimens in India is not well described.

Methods: This was a prospective observational feasibility study of 71 patients with HIV and tuberculosis that were treated with category I regimen of the Revised National Tuberculosis Control Programme (ethambutol, isoniazid, rifampicin and pyrazinamide thrice weekly for the initial 2 months followed by rifampicin and isoniazid thrice weekly for the next 4 months). Sputum was examined by smear and culture for Mycobacterium tuberculosis every month up to 24 months. Chest X-ray, CD4 cell count and viral load were done prior to and at the end of treatment. None of the patients received antiretroviral therapy.

Results: We present here the treatment response of patients with sputum culture-positive pulmonary tuberculosis to category I regimen. By efficacy analysis, among 43 patients treated with category I regimen, sputum smear conversion was observed in 79% and culture conversion in 82% at the second month. A favourable response was seen in 72% of patients. The mean (SD) CD4% fell from 12.6 (5.9) to 8.9 (4.9) ($p < 0.001$) with no significant change in mean (SD) CD4 cell count (169 [126] to 174 [158]; ns) at the end of treatment. Viral load change from 1.8×10^5 at baseline to 1.3×10^5 at the end of treatment was not statistically significant. Thirty-one patients, who completed the full course of treatment, were declared cured and were followed up for 24 months. Twelve had recurrent tuberculosis (39%); 16 of 43 (37%) patients had died by the end of 24 months, two-thirds due to causes other than tuberculosis.

Conclusion: Though the early bacteriological response to intermittent short course anti tuberculosis regimen was satisfactory, the overall outcome was adversely affected by the high mortality (during and after completion of treatment) and recurrence rate among HIV-infected patients with tuberculosis. Immune status deteriorated in spite of anti tuberculosis treatment, highlighting the need for antiretroviral treatment in addition to anti tuberculosis treatment to improve the long term outcome. The results of this pilot study need to be confirmed by larger studies.

Presenting Author	Bhawani PK
Title of the Presentation	Intermin Results: Evaluation of safety and efficacy of two different once daily anti-retroviral treatment regimens along with anti tuberculosis treatment in patients with HIV-1 and Tuberculosis – Randomized Controlled Clinical Trial

Swaminathan S, Padmapriyadarsini P, Venkatesan P, Narendran G, Ramesh Kumar S, Iliayas S, Pooranagangadevi, Meenalochani D, Sakthivel R, Ramchandran R.

Background: Nevirapine is the most widely used NNRTI as it is cheap and available in fixed-drug combinations. However, it has drug interactions with Rifampicin and it is not clear if they can be used efficaciously and safely together.

Objective: Conduct a randomized open-label clinical trial to assess the efficacy and safety of two once-daily anti-retroviral treatment (ART) regimens in the treatment of HIV co-infected patients with tuberculosis.

Methods: the trial was conducted at the Tuberculosis Research Centre, Chennai, India between May 2006 and June 2008. HIV-infected patients with pulmonary or extra pulmonary tuberculosis were enrolled and treated with standard short course anti-TB regimen (2EHRZ3/4RH3). At the end of the two-month intensive phase, patients were randomized to receive either Efavirenz (EFV) 600mg or Nevirapine (NVP) 400 mg (after a 14 day lead-in phase with 200 mg) along with Didanosine 250/400 mg and Lamivudine 300 mg, all given once-daily in the morning. Treatment was directly observed on three days of the week up to 24 weeks. Sputum smear and mycobacterial culture was performed every month. CD4 count and viral load were done at baseline, 4 weeks, 16 weeks and 24 weeks of ART and liver functions were monitored every 2 weeks for the first 2 months.

Outcome Measure: Viral load >400c/ml or death at 24 weeks was considered an unfavourable response. Intent to treat analysis was used and the proportion of the patients with failure compared using chi-square test.

Result: 127 HIV+ patients (99 males) with tuberculosis at a mean age of 35.5±7.6 (SD) years and mean weight of 42.3±8.0 years were randomized to the EFV or NVP regimen. Median CD4 count was 84 cells/mm³ and median viral load was 310000c/ml at baseline.

94 patients had pulmonary TB while 31 had extra-pulmonary disease. 92% of patients have successful treatment. By intent to treat analysis, at 24 weeks of ART, 50 of 59 in EFV arm and 38 of 57 patients in the NVP arm had VL <400c/ml, p=0.038. There were 5 deaths and 11 virologic failures in the NVP arm while there were no deaths and 5 failures in the EFV arm. There were 5 SAE in EFV and 6 in the NVP arm. The DSMB recommended withholding intake into the NVP arm in Dec 2007 and stopping intake to the study in June 2008.

Conclusion: compared to ddl/3TC/EFV, a regimen of once-daily ddl/3TC/NVP was inferior with higher virologic failure and death. Once-daily NVP should not be used in patients initiating ART while on ATT.

Presenting Author	Ramanathan VD
Title of the Presentation	Safety and Immunogenicity of DNA prime and Modified Vaccinia Ankara Virus HIV subtype C Vaccine boost in Indian volunteers.

Ramanathan VD, Mehendale S, Paranjape R, Sahay S, Thakar M, Makesh Kumar M, Sathyamurthi P, Goyal R, Cox J, Stevens G, Chetty P, Gilmour J, Sayeed E, Dally L, Loughran K, Lombardo A, Ackland J, Krebs M, Kochhar S, Excler JL, Fast P

Background: A modified vaccinia Ankara (MVA) vaccine (TBC-M4), expressing HIV subtype C env, gag, tat-rev and nef-RT and DNA plasmid vaccine (ADVAX) expressing env and gag and pol and nef/tat genes have previously been tested separately and found to be well tolerated and immunogenic in humans. We evaluated the safety and immunogenicity of ADVAX prime and TBC-M4 boost regimen in 32 healthy, HIV-uninfected adult Indian volunteers. Results reported are blinded.

Methods: Volunteers received intra-muscular injections of either ADVAX, 4 mg at 0, 1 and TBC-M4, 5x10⁶ pfu at 3 and 6 months or TBC-M4 at 0, 1 and 6 months with 12 vaccine and 4 placebo recipients per group at two sites. Reactogenicity was monitored at 3, 7, and 14 days post vaccination. T-cell responses were assessed on fresh cells by IFN- ELISPOT at baseline, 1 and 2 weeks post each vaccination.

Results: Vaccine or placebo was well tolerated. Mild or moderate cumulative reactions were observed in 62.6% and 75% for systemic and 50% and 62.5% of volunteers for local reactions in Groups A and B, respectively. No biological abnormality of clinical significance or serious adverse event was reported. In Group A, 2 weeks post injection, IFN- ELISPOT responses were detected in 20% of post 2nd ADVAX prime and 69.2% post 2nd TBC-M4 boost, while in Group B, in 37.5%, 30.8% and 73.3% post 1st, 2nd and 3rd TBC-M4, respectively. Responses were directed to multiple HIV proteins in most volunteers. The cumulative magnitude of HIV specific responses was 4-8 times higher in Group A than in Group B.

Conclusion: Vaccination with ADVAX prime and TBC-M4 boost or placebo appears to be safe and generally well tolerated. Preliminary data suggest a DNA priming effect on the immune response relative to MVA alone, modest in magnitude, and directed to all HIV proteins.

Presenting Author	Das A
Title of the Presentation	Prevalence and clinical management of common sexually transmitted infections among female sex workers in India

Lekharu D, Das A, Narayanan P, Prabhakar P, Gangakhedkar R, Risbud AR

Background: Effective control of sexually transmitted infections (STIs) among female sex workers (FSWs) is an important strategy to reduce HIV transmission. The *Avahan* program supported by the Bill & Melinda Gates Foundation has provided HIV prevention services to 200,000 female sex workers (FSWs) in six states in India since 2004. The essential STI service package (ESP) comprises syndromic management of symptomatic infections; presumptive treatment for gonorrhea and Chlamydia at first clinic visit, to be repeated if the FSW has not visited the clinic for six months; quarterly check-ups and bi-annual syphilis screening. The ESP was designed at the outset based on limited STI prevalence studies among sex workers in India. In 2008-9, a study was conducted with FSWs at known high STI prevalence sites (identified through the first round of Integrated Biological and Behavioural Assessment) to determine prevalence and assess clinical management of STIs.

Methods: 417 eligible and willing participants were recruited from three FSW clinics at two cities, Mumbai and Hyderabad. A behavioural questionnaire was administered; clinical examination including speculum examination performed and laboratory samples were collected. Vaginal swabs were tested for *Neisseria gonorrhoea* (NG), *Chlamydia trachomatis* (CT) by Nucleic Acid Amplification Test (NAAT) Gen Aptima Combo II; *Trichomonas vaginalis* (TV) by Roche PCR; bacterial vaginosis (BV) by Gram stain Nugent criteria; and yeast infection by KOH mount. Blood was tested for syphilis serology using Rapid Plasma Reagin (RPR) with confirmatory Treponema Pallidum Haemagglutinationan (TPHA) and anti-Herpes Simplex Virus (HSV) type 2 antibody. Genital ulcer swabs were taken for testing of *Treponema pallidum* (TP), *Haemophilus ducreyi* (HD) and HSV using multiplex polymerase chain (mPCR).

Results: The prevalence of gonorrhea among female sex workers was 14.1%, chlamydia 16.1%, while 26.1% had both gonorrhea and/or Chlamydia. A third of these infections were asymptomatic. One in every four individuals complaining of vaginal discharge had cervical infections. Prevalence of trichomonas, BV and yeast infections

were 31.1%, 71% and 21.1% respectively. More than a third of trichomonas infections were asymptomatic. Syphilis seropositivity was 10.1%, while HSV-2 antibodies were detected in 76.8% of the samples. Of the 12 individuals who had genital ulcers, mPCR of ulcer swabs revealed that six had TP, one had HSV and none had HD. The behavioural questionnaire showed that median number of commercial partners in the last week was four and 70% FSWs reported having one or more regular partners. Consistent condom use with commercial and regular partners was 82% and 29% respectively.

Conclusions: In the study population, presumptive treatment for gonorrhoea and Chlamydia is justified given the high prevalence of asymptomatic infections. The high prevalence of trichomonas with over a third of these being asymptomatic indicates the need for considering addition of metronidazole to the current presumptive treatment regime. FSWs with vaginal discharge should be treated for both vaginal and cervical infections. Risk-reduction measures, including consistent condom use should be re-emphasized. Partner treatment strategies for regular partners need to be explored.

The study was conducted at known high prevalence sites and the eligibility criteria aimed to identify individuals at higher risk, hence the STI prevalence levels observed and management strategies outlined above may not be generalizable to all sex worker sites in India.

“HIV/AIDS has become a serious socio-economic and developmental concern. We have no choice but to act, and act with firmness, with urgency and with utmost seriousness.”

Dr. Manmohan Singh,
Prime Minister of India

Presenting Author	Tripathy S
Title of the Presentation	Generation of HIV-1 subtype C base DNA vaccine candidates assessment of prime boost immunization strategy in mouse model

Tripathy S.

Objectives:

1. To generate HIV1-1 subtype C *env*, *gag* and *codon* optimized *env* expressing recombinant plasmids
2. To study the immune responses to various recombinant plasmids and their combinations in mouse model (with or without co-administration of IL-12 and GM-CSF expressing plasmids)
3. To study the effects of 'DNA prime-protein boost' strategy on mouse immune response

Methodology: The pre-seroconverter samples were collected from recently infected adults. The *env* and *gag* genes were amplified and cloned in the pVAX-1 vector. These clones were used for priming of the host. The *env* and *gag* DNA containing pVAX vector was used either alone or in combination with IL-2 and GM-CSF containing plasmids for the immunization of mice. The best vaccine combination giving good CTL activity as well as neutralization antibody response was used for further immunization of mice using the prime – boost technique.

Results: Significantly better immune response was observed using ELISA absorbance/OD, CTL response and neutralization in mice sera using DNA prime with gp 120 containing vaccinia regular boost (pvGag+gp150+IM+Vaccinia on 5th week) than observed by boosting only on 6th week (pvGag+gp150+IM+gp 120 Vaccinia. Gp150 (envelope construct of HIV-1 C) +Gag (pVAX Gag construct of HIV-1 C) + cytokines (IL12+GM-CSF) + Modified Vaccinia (containing gp120) was the best vaccine combination. This DNA Vaccine construct when administered in 3 week old female BALB/C mice with consecutive three intramuscular doses on 0th week, 2nd week and 4th week resulted in CTL response for envelope peptides (E2, E3) and gag (G1, G2) peptides.

Conclusion: The results of this study indicate that the DNA Vaccine construct gp150 (envelope construct of HIV-1 C)+Gag(pVAX Gag construct of HIV-1 C) + cytokines (IL12+GM-CSF) + regular boost with Modified Vaccinia (Containing gp120) in the vaccine formulation gave the best possible CTL and neutralizing antibody response among the various combinations tried out.

Presenting Author	Ramana Rao PV
Title of the Presentation	Augmentation of natural killer activity with exogenous interleukins in patients with HIV and pulmonary tuberculosis co infection.

Ramana Rao PV, Rajasekaran S, Raja A.

Published in AIDS Res Hum Retroviruses. 2008 Nov;24(11):1435-43.

A depressed level of natural killer (NK) activity is one of the various immunological abnormalities in HIV infection. Defective NK cell functions can be partially restored in vitro by interleukin (IL)-2 and IL-12. IL-15 shares receptor and several biological properties with IL-2. The effect of IL-15 on NK cells in patients with HIV and tuberculosis co infection (HIV-TB) is unclear. This study examined the cytotoxic activity and cytokine response of NK cells in HIV-TB after stimulation with IL-15 and IL-12/IL-2. The study includes 16 normal healthy subjects (NHS), 15 patients with pulmonary tuberculosis (TB), 15 HIV-infected subjects (HIV), and 15 HIV-TB patients. The cytotoxic activity of NK cells was assessed by diode-labeled anti-CD3 antibody-based flow cytometry. Interferon-gamma present in the culture supernatants was measured by enzyme-linked immunosorbent assay. Basal NK cytotoxicity was found to be lower in HIV-TB ($p < 0.05$) and HIV when compared to NHS or TB. Maximal NK cytotoxicity ($p < 0.05$) was observed with an IL-15 and IL-12 combination in all the groups. At a 50:1 effect or target ratio, the mean fold increase in NK cytotoxicity upon stimulation was 2.11 for HIV and 1.84 for HIV-TB. Interferon-gamma levels from the stimulated cultures were elevated ($p < 0.05$) in the HIV and HIV-TB groups. We found no correlation between NK cytotoxicity and CD4 counts in HIV-TB. There is a positive correlation between NK cytotoxicity and interferon-gamma secretion for HIV-TB. The combination of IL-15 and IL-12 may have potential to improve the NK activity of HIV and HIV-TB.

Presenting Author	Ramana Rao PV
Title of the Presentation	Natural-Killer Cell-Derived Cytolytic Molecules in HIV-Associated Pulmonary Tuberculosis-Role of Exogenous Interleukins

Rao PV, Ramanavelan S, Rajasekaran S, Raja A.

Published in J Clin Immunol 2010 Mar 13. [Epub ahead of print]

Objective: The ability of NK cells to produce cytolytic molecules is impaired during HIV infection. The objective of the present study is to investigate whether impairment in production of innate cytokines in HIV-infected individuals is responsible for the defective NK cytolytic response.

Material and Methods: The study included 30 subjects each of normal healthy subjects, pulmonary tuberculosis patients, HIV-infected individuals, and patients with HIV and TB co-infection. Intracellular staining method was adopted to enumerate the NK cells positive for cytolytic molecules. Highest stimulation of cytolytic molecules was seen with IL-15 + IL-12 combination.

Results: Stimulation with IL-15 + IL-12 showed an increased expression of perforin in NHS and HIV groups. Granzyme A was stimulated only in HIV, even with IL-15 + IL-12. Among the cytolytic molecules, maximal stimulation with IL-15 + IL-12 was seen for Granzyme A and Granzyme B. Both the HIV and HIV-TB groups showed an increased response with IL-15 + IL-12 for granulysin.

Conclusion: Supplementing IL-15 + IL-12 in vitro increased the number of NK cells that are expressing cytolytic molecules in HIV-infected individuals but in HIV-TB, the critical cytolytic molecule, perforin is not apparent perhaps due to the influence of TB on HIV.

Presenting Author	Ramana Rao PV
Title of the Presentation	Natural killer cell-mediated cytokine response among HIV-positive south Indians with pulmonary tuberculosis

Ramana Rao PV, Rajasekaran S, Raja A.

Published in J Interferon Cytokine Res. 2010 Jan; 30(1):33-42.

Natural killer (NK) cells control Mycobacterium tuberculosis infection mainly through secreted cytokines. Cytokine dysregulation among HIV may cause rapid disease progression. Our objective was to examine whether impaired production of innate cytokines are responsible for cytokine dysregulation during HIV infection. The study included 30 subjects each of normal healthy subjects (NHS), pulmonary tuberculosis patients (TB), HIV-infected individuals (HIV), and HIV-TB co-infected patients (HIV-TB). Intracellular cytokine staining method was used to enumerate the cytokine-positive NK cells. Unlike NHS (100%), only 27% of HIV-TB and 57% of HIV infected patients have detectable plasma interleukin (IL)-15 levels that signify impaired rather than decreased IL-15 production. Basal type 1 cytokine (IL-2, interferon-gamma [IFN-gamma], and tumor necrosis factor-alpha [TNF-alpha])-secreting NK cells (NK1 cytokines) were decreased significantly ($P < 0.05$) in TB, HIV, and HIV-TB, when compared with NHS. Stimulation with M. tuberculosis H37Rv enhanced the NK1 cytokines in NHS ($P < 0.05$), but not in other groups. With IL-15+IL-12 stimulation, we found increased NK1 cytokines (IL-2 and IFN-gamma) in HIV ($P < 0.05$), but not in HIV-TB, when compared to unstimulated condition. Supplementing IL-15+IL-12 has potential in improving the frequency of NK1 cytokines for HIV, but not HIV-TB, suggesting that TB influences cytokine response during HIV infection.

Presenting Author	Ramachandran G
Title of the Presentation	Steady-State Pharmacokinetics of Nevirapine in HIV-1 Infected Adults in India

Ramachandran G, Hemanthkumar AK, **Rajasekaran S**, Padmapriyadarsini C, Narendran G, Anitha S, Subramanyam S, Kumaraswami V, Swaminathan S.

Published in J Int Assoc Physicians AIDS Care (Chic Ill). 2007 Dec; 6(4):251-4.

Background and Objectives: A variety of demographic factors, sex, and degree of immunosuppression can influence antiretroviral drug concentrations. The authors studied the influence of immune status, sex, and body mass index (BMI) on the steady-state pharmacokinetics of nevirapine delivered as a fixed-dose combination in HIV-1-infected patients in India.

Methods: Twenty-six HIV-1-infected adult patients undergoing treatment with nevirapine-based highly active antiretroviral therapy regimens participated in the study. Pharmacokinetic variables were compared between patients divided based on CD4 cell counts, sex, and BMI.

Results: Patients with higher BMI had lower peak and trough concentration and exposure of nevirapine than those with lower BMI; none of the differences in the pharmacokinetic variables of nevirapine between the various patient groups was statistically significant. **Conclusions:** Patients' immune status, sex, or BMI had no impact on the pharmacokinetics of nevirapine. Plasma nevirapine concentrations were maintained within the therapeutic range of the drug in the majority of the patients.

“Today ... let us renew our commitment to work together to find new ways of reaching out with compassion, with empathy and with understanding to the millions of men, women, and children who are the tragic victims of the physical and social devastation caused by HIV/AIDS.”

Smt. Sonia Gandhi,
MP and Chairperson UPA Government

Presenting Author	Sarna A
Title of the Presentation	Factors Affecting Enrolment of Newly Diagnosed HIV Positive Persons into ART services in India

Sarna Avina, Bachani Damodar, Sebastian Mary, Sogarwal Ruchi and Battala Madhusudana.

Background: India had an estimated 2.31 million people living with HIV at the end of 2007, with a HIV prevalence of 0.34 percent. Despite the low HIV prevalence, these statistics place India among countries with a large number of people living with HIV (PLHIV). To address the care and support needs of PLHIV, the Ministry of Health and Family Welfare, initiated a national programme in 2004 to provide free ART for PLHIV. At the end of March 2009, there were 211 functioning ARTCs and 254 Community Care Centres across the country, and to date 2,17,781 are receiving ART. A major challenge for the health system with its network of ART centres has been to increase utilization of ART services and enrolment into the program. The Population Council, with support from NACO, undertook a multi-site study in high and low HIV prevalence states to understand the context and factors that influence the uptake of ART services.

Methods: The study was conducted in two phases. In preparatory phase we undertook analysis of secondary data (testing/registration between October 1, 2008 and March 31, 2009) collected from 30 ICTCs and 10 corresponding ART centres from ten districts across seven states. Based on the findings, we undertook a prospective observational cohort study among newly diagnosed HIV-positive people tested at ICTCs to explore the barriers and facilitators for enrolment into ART services. Data were collected from 27 ICTCs and nine corresponding ART centres from nine districts across six states: Rajasthan, Uttar Pradesh, Gujarat, Andhra Pradesh, Maharashtra, and Karnataka (September 2009 to March 2010). Individuals who tested positive at selected ICTCs were recruited into the study and followed till their registration at the referral ART centre. Those who did not

register at the referral ART centre were tracked in the community for a follow-up interview.

Results: A total of 1057 newly diagnosed HIV positive people were recruited into the cohort from 27 ICTCs and followed prospectively for 2 months. Overall, 51.7 percent participants were females. The mean age was 34.7 years (SD 8.9). Across all states, majority (65.3%) of the respondents were married. Three-fourths participants were employed; men more likely to be employed compared to females. 68% of employed participants were working as agricultural or other manual labour.

Almost three-fourths (73.5%; n=777) of the cohort registered at ART centres within two months of collecting their HIV test result; 17.9 percent (n=189) did not register at ART centres and were successfully interviewed in the community, 5.6 (n= 60) percent were tracked but not interviewed for a variety of reasons and 3 percent (n=31) participants were untraced and lost to follow-up.

The majority of the HIV-positive participants, who did not register at ART centres and were interviewed in the community, were not accessing ART, nor had undertaken CD4 tests to assess their eligibility for treatment (90.4%).

A perception of relatively good health removed the urgency to register immediately for several clients (30%), while work and family engagements kept others away from the ART centre (22%). The fear of disclosure of their HIV status, being recognised by villagers or relatives and resulting stigma was the overriding concern for many others (9%). Although ART is offered free at government centres, financial difficulties and travel expenses were deterrents for several participants (9%). Health, financial difficulties, lack of transport arrangements and not having people to accompany them make travelling to distant ART

centres were burdensome for PLHIV. Other reasons included family opposition, waiting for TB test results, the distance of ART centres compounded with severe illness. Study findings show that younger clients, single clients and working as unskilled manual labour were more likely to not register at ART centres.

Most of the respondents (82.9%) had received information about the availability of free ARV medications at government ART centres and had been given referral slips for designated ART centres by the counsellors at ICTCs (77.5%).

Conclusions and Policy Implications: The majority of newly diagnosed HIV-positive people do register at ART centres. While barriers that deter HIV-positive people from accessing treatment services do exist, they are not insurmountable. Addressing client and health system barriers would serve to increase uptake of services.

The study shows that HIV positive persons can be successfully followed in the community. It is important that counsellors at ICTCs track all newly diagnosed HIV positive people in the community to provide support and facilitate timely registration at ART centres.

Presenting Author	Saggurti N.
Title of the Presentation	Male Out-Migration and HIV among men and women in districts with high out-migration: Findings from a case-control study

Saggurti Niranjan, Swain SN, Mahapatra BB, Battala M, Narang Alka, and Johri Aradhana.

Objective: To examine the linkage between male out-migration and HIV in districts with high out-migration.

Methods: The data are obtained from a case-control study conducted among married men and women during February - August, 2010, in three well-known corridors of migration (Ganjam-Surat, Eastern UP -Mumbai/Thane, Northern Bihar - Delhi/Haryana) with different HIV epidemic scenarios. Individual married men and women tested for HIV at the ICTCs during this period were recruited as part of this study, in which HIV-positives are the cases and HIV-negatives are the control subjects. Through this procedure, approximately, 400 married men and 400 married women were recruited from each study area. Information on male migration exposure ever, status of current migration, corridor of migration, duration since the first migration were used to understand its linkages with HIV transmission among married men and women. The adjusted odds ratios (AOR) population attributable risks (PARs) were calculated.

Results: Among men interviewed, between 60-90% of HIV positives and 30-60% of HIV negatives had ever migrated for job/work. Nearly two-thirds of the total migrants were returnee migrants and rest were migrants employed in districts other than their place of origin. After adjusting for socio-demographic characteristics, results from the multivariate analyses reveals that migrant males, particularly returnee migrants and those travelling to specific high HIV prevalence destination areas including Surat, Mumbai, Kolkata, were more likely to be infected with HIV compared to non-migrants.

The results further indicate, between 40-80% of the total male HIV infection in the surveyed population can be attributed to their migration exposure; and this proportion varied by the study districts. Similar to the results from men's survey, women with migrant spouses were more likely to be HIV positive than the women with non-migrant spouses. Nearly half of the female HIV infections in some of the districts can be attributed to their spousal migration and rest of the infections can be attributed to other local sexual risks within the district.

Conclusion: The relative comparison of the data across three study corridors suggest that -- the HIV sero-positivity is strongly concentrated among migrant men and their wives in northern Bihar and eastern UP; whereas the relationship is less stronger in case of Ganjam district. These results highlights the need for initiation of interventions with men and women from high out-migration areas, with an immediate and special focus on return and active migrant men and women, female spouses of migrant men.

Presenting Author	Bradley JE
Title of the Presentation	Higher levels of HIV-related risky behaviour reported in polling booth surveys compared to face-to-face interviews in a general population survey in Mysore district, Karnataka state, Southern India

Lowndes CM, Jayachandran AA, Pradeep BS, Ramesh BM, Washington R, Mahapatra B, Blanchard J, Moses S, Alary M.

Objectives: To estimate levels of HIV-related risky behaviours in the general population of Mysore district using different interviewing techniques, in the context of the monitoring and evaluation of a large preventive intervention targeting vulnerable populations (Avahan, the India AIDS Initiative of the Bill & Melinda Gates Foundation).

Methods: This study was carried out from 10/2005 to 11/2006. We used a stratified two-stage sampling method to randomly select 6000 subjects equally distributed between rural and urban areas (clusters) and between men and women aged 15 to 49 (randomly selected from each cluster). After providing informed consent, each participant was administered a face-to face interview (FTFI), and blood and/or urine samples were taken for HIV/STI testing. A separate sample of 3000 subjects was drawn using the same sampling frame for conduct of polling booth surveys (PBS). In PBS, a group of respondents answer a simple set of yes/no questions by putting voting cards in different colour-coded boxes corresponding to 'yes', 'no' and 'not applicable' answers. Responses are anonymous and not traceable to individuals, since the data are subsequently analysed only for the group as a whole. Between 14 and 19 questions were asked to separate groups of 15-20 unmarried and married men and women (four groups).

Results: The response rate was 81% for the FTFI (4663/5732) and 65% (2013/3100) for the PBS. The lower response rate for the PBS was primarily due to the difficulty of gathering groups of sampled individuals together at the same time, rather than to refusals. Tables 1 and 2 (see annexure) show statistically significant differences in rates of

reporting of HIV-related risky sexual behaviour between these two methods. Consistently higher rates of sex with different partner types were reported in all groups in PBS vs. FTFI. For example, 6% vs. 2% of unmarried males, and 8% vs. 2% of married males, reported ever having had sex with a female sex worker (FSW), respectively. 7% vs. 2% of unmarried males, and 5% vs. 0.5% of married males, reported ever having had anal sex with a man, respectively. Both married men and women reported higher rates of extra-marital sex for themselves and their spouse in the PBS. Married women also reported more frequently thinking that their husband had ever had sex with an FSW (12% vs. 2%).

Conclusions: The results of this survey strongly suggest significant rates of under-reporting of HIV-related risky behaviour in a general population survey in Southern India using face-to-face interviewing techniques. This is likely to be due to the strong social proscription of pre- and extra-marital heterosexual sex, anal sex and homosexual sex in this culture. These results are borne out by the biological test results, where 6 cases (out of 43 in the whole study) of *C. trachomatis* and 2 cases (out of 5) of *N. gonorrhoeae* were found among subjects reporting no sexual experience in the FTFI. Increasing the confidentiality/anonymity of the interview setting may aid in achieving more accurate rates of reported sexual behaviour in Southern India.

Presenting Author	Christina DT
Title of the Presentation	Reaching the Un-reached: An Exploratory study of hidden sex workers and their HIV risk behaviours in Tamil Nadu

Bimal C, Christina Dorothy T

Background: The face of sex work has undergone a rapid change with the development of technology. Newer forms of sex solicitation through newspapers, mobile phones and internet have caught up in a major way in the form of non-brothel, non-street based and home based sex work. The principal reasons for this shift in preference could be the fact that houses offer more security and safety to sex workers and their clients as compared to hotels, motels, parks, bars, or parlours, where frequent raids and harassments exist. Hence, even female sex workers who practice sex work as their occupation have adopted the concept of newly evolved sex work. Another reason could be the entry of house wives, professionals, students and even women from well-off families for fun, pleasure, adventure, lucrative offers and money to lead an extravagant life. This has allowed sex work to go off-stream thereby making interventions difficult to reach these sections. There are enough evidences that the HIV epidemic is moving from urban to rural and high-risk population to general population. It is also apparent that there is no one epidemic; rather, there are several small and large localized sub-epidemics with their own dynamics and rates of growth, reflecting the diversity in socio-cultural patterns and multiple vulnerabilities. These indicate the possibilities of many hidden population with high-risk sexual behaviours. This study intended to explore the dynamics of different hidden sex workers and understand their risk behaviours, knowledge levels on STI, HIV/AIDS, treatment methods and identifying suitable intervention among them.

Methods: A cross-sectional study design was used to determine the characteristics of various categories of hidden sex workers, their high- risk behaviours and the pattern of sex work practices. The eligibility criteria were individuals, who were not previously identified by an NGO, not part of any intervention programs and not engaged in street based or brothel based sex work. The groups included in the study were escorts, masseurs, housewives, students, bar dancers, side actress/actors, call boys/girls, discotheque performers or anyone who practiced sex work as part time or full time and clients of sex workers.

A respondent-driven purposive convenient sampling technique was used. Subjects answered a questionnaire that gathered descriptive data on their socio-economic background, their sex work pattern, STI symptoms and sexual risk behaviours. A Sample of 512 respondents was included in the study from various hidden groups.

Results: Most of the subjects were in the age group of 18-35 years, while masseurs, housewives and business people were in the age group of 20-47 years. Most of the masseurs, housewives, business people and students had a graduate qualification or above, while only few bar dancers and the unemployed possessed a graduate degree. Clients contact was primarily through phone (direct contact), agents (pimps, brokers and event coordinators), friends, newspaper advertisements, and others directly from hotels. Every third time, students, call boys and business people used the internet to seek their clients. A majority of the subjects reported knowing the sexual mode of HIV transmission while 25 percent of students were completely unaware. Side actresses (22.3%), escorts (80%), students (43%) and business people (75%) reported they did not use condoms during every sexual act. Rate of condom use fell further among regular partners such as lovers or spouses which corroborates with the other studies as well. About 80 percent of escorts, 57 percent call boys, 19 percent housewives and 19 percent students reported being forced not to use condoms in the past. The risk perception among the respondents was reported low. Side actresses reported facing some form of harassment (beating, forced to drink/use drugs, forced sex and abusive language) initially while a majority of bar dancers (84%) reported physical or psychological harassment regularly. To deliver health promotion messages and other services, the preferred medium suggested were TV, newspaper, pamphlets, cinema magazines, their agencies, doctors and the internet.

Conclusion: Hidden sex workers are highly vulnerable due to their involvement in unsafe sexual practices and are at greater risk of contracting STIs, and HIV than the conventional sex workers. Programmes targeting these hidden sex workers are vital to reduce the risk behaviour and to increase access to various HIV/AIDS related services. The prevention strategies could include the communication tools popular among these groups such as telephone and internet.

Presenting Author	Halli S
Title of the Presentation	The link between mobility and HIV risk among recent male migrants in Karnataka, India

Halli S, Buzdugan R, Blanchard J, Channakki HR, Niranjana S, Verma RK, Moses S.

Presented at XVII International AIDS Conference, Mexico City, Mexico, August 3-8, 2008.

Background: While the link between migration or mobility and HIV risk has been assumed, data to support this link are scarce. We undertook a large-scale study covering recent male migrants in Karnataka, working in a variety of occupations, to understand the HIV risk associated with their mobility.

Methods: The study was conducted in 2007 in five districts of Karnataka by the Karnataka Health Promotion Trust, in collaboration with the Population Council. It used both qualitative and quantitative methodology, consisting of 292 in-depth interviews and 2640 survey questionnaires. Qualitative data were analyzed using content analysis and the quantitative data using multiple regressions. HIV risk was measured using a composite index constructed based on variables such as pre- or extra-marital sex, visits to sex workers, condom use and reported symptoms of sexually transmitted infections.

Results: Degree of mobility was not a significant predictor of HIV risk, after controlling for age, education, income, occupation, marital status, exposure to pornography and alcohol consumption. Alcohol consumption and exposure to pornography by themselves were strong predictors of HIV risk. Unmarried men, and married men living without their spouse at the place of destination, were at higher HIV risk compared to married men living with their spouse. Moreover, men working in certain occupations were at high HIV risk, namely sugarcane cutters, fishermen, road construction and mining workers. These findings are supported by the qualitative data.

Conclusions: These data suggest it is not increased mobility that puts men at higher risk for HIV, but working in certain occupations and various behavioural factors that are not necessarily related to their migrant status. Behavioural change among male migrants working in high-risk occupational groups should be a focus of HIV prevention programs.

Presenting Author	Tucker S
Title of the Presentation	Anal Sex Practices amongst Female Sex Workers in Andhra Pradesh

Tucker S, Swarup P, Anand P.

Background: As documented in several recent studies, anal sex among heterosexual couples is on the rise. Considering that unprotected anal sex possesses greater risk of HIV transmission than vaginal sex, India HIV/AIDS Alliance undertook a study to understand anal sex practices among female sex workers (FSW) in Andhra Pradesh in 2009.

Methodology: The study was conducted among FSW attending eleven randomly selected STI clinics in the Avahan supported targeted interventions managed by India HIV/AIDS Alliance in Andhra Pradesh. A qualitative study, conducted through focus group discussions and in-depth interviews with 100 FSW, was complemented by a quantitative study conducted through a structured questionnaire, administered to the first 50 FSW attending the clinic at each site (Total 550 participants).

Results: The study revealed a high prevalence of anal sex practices among FSW (reported rate for self 18% but 39% for others), who reported indulging in anal sex with commercial clients (51%), regular partners (29%) and husbands (18%).

The reasons for anal sex practices included more money (61%); influence of client (45%); risk of losing client (27%); and forced sex (1.2%). The FSW believe that the client's demand for anal sex is due to higher thrill/pleasure with anal sex (55%); influence of blue films (46%) and experimentation (17%). Bleeding and injury to the anal canal were perceived as associated risks by 90% while only 28% associated it with a higher HIV transmission risk. Reported condom and lubricant use was about 88% and 39%, respectively.

Conclusion: This study reveals that frequent anal sex, infrequent use of condom and lubricant, economic and physical coercion, and low awareness of STI/HIV transmission risks among FSW, which have serious implications for HIV prevention programs, pointing to a need for greater focus on anal sex education and distribution of lubricants along with condoms in FSW-targeted interventions.



“Our common goal is Universal Access to HIV prevention, treatment, care and support. We must also work to make the AIDS response sustainable.”

Shri. Ghulam Nabi Azad,
Indian Minister of Health and Family Welfare



Presenting Author	Kumar R
Title of the Presentation	Impact Assessment of Targeted Intervention on Heterosexual Transmission of HIV in India

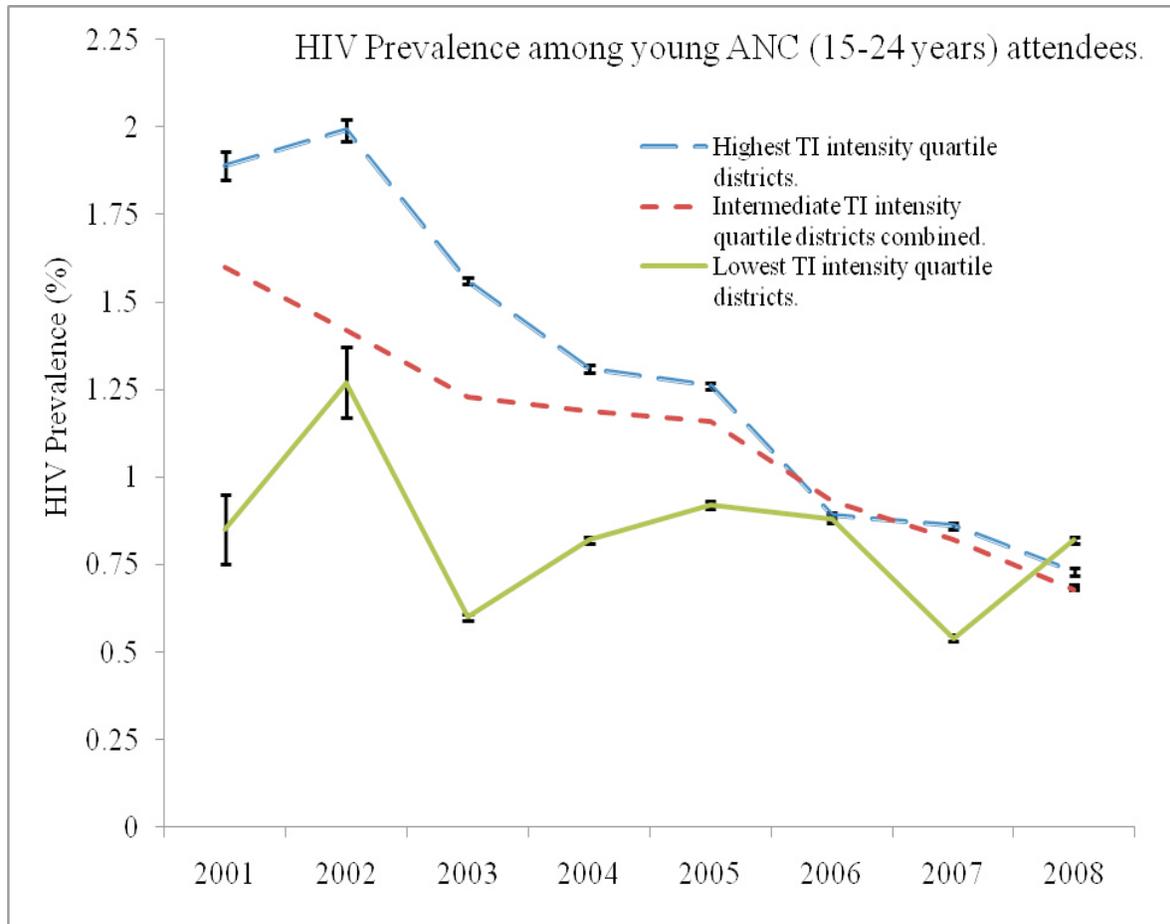
Kumar R, Mehendale SM, Panda S, Lakshmi PVM, Kaur M, Prinja S, Singh T, Viridi N, Bahuguna P, Sharma AK, Godbole S, Risbud A, Manna B, Thirumagal V, Sogarwal R, Venkatesh S.

Background: Targeted interventions (TIs) have been a major strategy of HIV prevention in India. We assessed the impact of TI strategy.

Methods: Quasi-experimental approach was used to retrospectively compare changes in HIV prevalence according to the intensity of TI implementation. Number of condoms distributed by TIs was used as an indicator of TI intensity. Service data of TIs from 1995 to 2008 was obtained from program records. Primary data of HIV sentinel surveillance, behavioural surveys, and high risk mapping studies were analyzed to compare changes in HIV prevalence among districts according to intensity of TI implementation while controlling for socio-demographic variables in logistic regression analysis. This analysis was carried out only for the states of Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra where robust data was available in

Results: In high TI intensity quartile districts (n=30), 186 condoms were distributed per FSW/year through TIs as compared to 45 condoms/FSW/year in low TI intensity quartile districts (n=29). Significant decline in HIV was observed among FSWs in high TI intensity quartile districts (34%) (OR=0.66, 95% CI 0.58-0.76) from 2004 to 2008 compared to 28.5% decline in the low TI intensity quartile districts (OR=0.7, 95% CI 0.49-1.01). HIV decline among ANC (15-49 years) attendees from 2001 to 2008 was significantly more in high TI intensity quartile districts. Among young (15-24 years) ANC attendees also the decline was significantly higher (61%) in high TI intensity quartile districts (OR=0.42, 95% CI 0.32-0.55) than the decline (3.5%) in low TI intensity quartile districts (OR=1, 95% CI 0.6-1.8).

Conclusion: TIs strategy is associated with HIV decline in India.



Presenting Author	Dutta D
Title of the Presentation	Assessment of the access and utilization of PPTCT services

UNICEF

Aim: To undertake an evaluation of the performance of the selected PPTCT sites with reference to access, utilization and quality of services in high, medium and low burden states.

Objectives:

- To gather primary data from the selected 45 PPTCT sites in 5 states
- To analyse the data and to identify strengths and weakness in implementation of PPTCT services with specific reference to their access and utilization.
- To analyse the quality of data management (recording, transmission and use of data) at the central level

Findings:

Availability of services

The study found that services like delivery, referral, outreach and follow up for exposed babies were not available in low burden states and to some extent in Maharashtra.

Across the states follow up services are hampered due to low level of interaction between the referral centres and ICTCs and clients not coming back to report to their ANC clinics.

The study observed that apart from antenatal care visits to the ANC clinic, the clients also came back for HIV counselling and testing, growth monitoring and delivery indicating that the process of counselling is working with the clients.

Other than PPTCT services, majority of the sites reported offering HIV/TB and STI related services. 30 sites reported providing services of family planning and condom, while 25 on preventive measures. Advice on periodic check up or window period was

too low indicating a review of what all needs to be covered in post test counselling of negative women

Availability of network which gives nutritional support and provides infant feeding choices to HIV infected women was found low. The counsellor's knowledge on availability of such services was moderate as they pointed out low level of interaction with such networks and most of them felt that these are offered by the Positive Networks only.

Accessibility

The study noticed that distance travelled by the clients to reach the ICTC was more than 20 Kms for some sites in states like Maharashtra, Tamil Nadu, and Uttar Pradesh. Signage for indicating the location of the service was not uniform across the states.

Utilization of the services

The clients and the counsellors feel 'stigma' as a major constraint towards full utilization of the services.

Lack of awareness of the community women about the availability of services and benefits, fear of being stigmatised, lack of trust on service providers need to be addressed to increase the uptake of the services of ANC clinics.

Counsellors from reported distantly located centres, delay in getting testing results, shortage of testing kits and availability of guidelines in local languages, overcrowded centres, and non availability of specialists as barriers in utilizing the PPTCT testing services.

Men's involvement was reportedly good in 7 sites of Tamil Nadu and 3 sites of Uttar Pradesh. 'HIV will not happen to me' and 'testing have anything to do with me' is a common feeling among the men across the states.

The counsellors indicated towards bringing down the workload, involvement of more colleagues, reduction in documentation work and emphasizing the quality of work rather than being target oriented for improving service delivery and utilization.

ART centres located in far off places, time taking services, lack of communication with the referral centres and other networks are some other constraints pointed out by the counsellors towards better service delivery.

Quality of PPTCT services

Skills

Although more than 50 percent of them reported taking the Orientation Training of 12-14 days duration, Refresher Training was attended by only 37 of them. PPTCT Team Training was also reported low indicating a review of the requirement of training.

Similarly, the training requirement of the Laboratory Technicians needs to be reviewed.

Counsellors of 19 sites reported inadequate staff for counselling.

With the current workload and stress, 20 sites reported experiencing burnout.

Relating to their workload and job stress in the service the Counsellors felt that they are underpaid.

Infrastructure

Inadequate and cramped space for group counselling was observed in all the states except Maharashtra. However, privacy and confidentiality was maintained in majority of the sites.

Systems

Multiplicity of identification methods of positive clients was noticed

Except for 3 sites in Gujarat, 4 sites of Rajasthan and 1 site in Tamil Nadu, single window system was followed for collection of blood samples after the patient has been counselled.

No uniform policy was found in the states about handling delivery of unbooked positive patients.

While ANC client register, laboratory register and stock registers were found in all the sites, only 8 sites reported having NVP stock registers in place.

Posters, condom demonstration models and flip books for informing the patients were available in majority of the sites. The study noticed no specific 'takeaway' materials for the women and materials for illiterate patients.

Storage of Nevirapine in Sister's room in Gujarat, Laboratory in Gujarat and Rajasthan points towards non-availability of the same round the clock.

Clients were quite satisfied with the behaviour and skills of the counsellors

The clients reported knowing about safe sex and prevention from mother to child as the topics discussed. However the low recall on 'how to behave with a positive person' and 'chances of babies getting infected' calls for reviewing the topics of discussion during the counselling session and prioritizing them based on the local needs.

The study brought out that the care and treatment package available on site or the knowledge of it for HIV positive mother and HIV exposed infants is not uniform. Understanding of the use and purpose of PCP prophylaxis was found low.

Presenting Author	Chan P
Title of the Presentation	Mid-Term Review of the National STI/RTI Control & Prevention Programme

Pathni A, Das A, Prasad TLN, Singh AK, Kumta S, Chan P

Background: As part of the mid-term review (MTR) of National AIDS Control Programme, phase-3 (NACP III), a comprehensive review of the Sexually Transmitted infection (STI)/ Reproductive Tract infection (RTI) control and prevention programme was carried out with the following objectives:

- Collect evidence on STI/RTI magnitude in different population groups.
- Document change in trends in epidemiological profile of cases and population groups.
- Recommend mid course correction for target setting and strategic plan.
- Define further operations research questions.

Methods: The review comprised of three distinct activities: (i) Desk review of published and unpublished studies on STIs/RTIs in India; (ii) Field visits to select states to review the implementation of the STI/RTI programme for targeted Interventions (TIs); (iii) Analysis of the NACO Computerized Management Information System (CMIS) data from 2005-09 for select states.

Results:

Desk review: STI studies in the period 2000-2009 were reviewed. Most available data was from clinic-based studies. The review highlighted the wide variation in STI/RTI prevalence in the country - based on both syndromic and aetiological diagnosis. Interpretation of STI prevalence data was complicated overall by the wide variety of methods for laboratory diagnosis and incomplete description of methodology.

Burden of STIs: *General population:* Rates of STIs in the general population were similar in urban and rural areas. A high proportion of STIs/RTIs identified by screening tests among

females were asymptomatic. Except Delhi, all the other population based surveys showed that prevalence of reactive syphilis serology in males was 2%; and females 1.2%. In females prevalence of *Neisseria gonorrhoea* (GC) was 1.9%, and *Chlamydia trachomatis* (CT) was 1.3%. In males, although the prevalence of CT was low (1.1%), the prevalence of GC infection was higher (up to 3.9%).

There was a considerable burden of RTIs among females: prevalence of candidiasis ranged from 7.2% to 23.9% and bacterial vaginosis from 17.8% to 63.7%.

High risk groups (HRGs): Syphilis seropositivity was high and variable among HRGs. Syphilis seropositivity and HIV seroprevalence was higher in transgenders as compared to men who have sex with men (MSM). A significant percentage of MSM had oropharyngeal and rectal gonorrhoea. While the prevalence of Chlamydia infection was low in MSM, different studies recorded widely varying values in FSWs. HSV2 seropositivity (IgG) was high in both FSWs and MSM.

Trends of STIs: HIV sentinel surveillance data showed a general declining trend in syphilis prevalence among ANC attendees in the high prevalence states which was corroborated by NACO CMIS data.

Operational Issues: Only about half of general population with STI symptoms seeks treatment. A substantial proportion of HRGs and clients of FSWs resort to home-based remedies, buying medication from chemist shops, or no treatment at all. A 2005-06 study showed that laboratory capability for syphilis screening is available in less than 3% of primary health centres and less than 25% of community health centres in the country.

Monitoring of gonococcal susceptibility was episodic and limited in geographic scope. Though gonococcal isolates reported as “less sensitive” to ceftriaxone were described in a few studies, no studies had reported the clinical outcome data validating these *in vitro* findings or the minimum inhibitory concentrations using agar dilution techniques.

Field Visits: At TI-STI sites, clinic attendance over June-August 2009 ranged between 16-25% of the total HRGs. The proportion of clinic attendees diagnosed with an STI syndrome ranged from 37% (Kerala) to 96% (Orissa). In West Bengal, Kerala and Uttar Pradesh, data showed a lower proportion of GUD (9-16%), while Orissa was high (35%). Syphilis screening coverage over six months varied from 4% (Tamil Nadu) to 39% (Maharashtra). NACO recommended presumptive treatment regime for HRGs was being followed. Syndromic management guidelines were adhered to in about half the sites visited. Under usage of penicillin injections was a constraint in certain states. Less than one-third of the government sites visited had adequate stocks of pre-packaged colour coded STI treatment kits.

Majority of clinic staff were trained in syndromic management, however the training was not specific to STI management among HRGs. Less than half of the sites had adequate facilities for clinical examination. In addition supervisory visits were not being carried out on a regular basis. Majority of NGO clinics had good coordination mechanisms with outreach teams; but such systems were found lacking in Preferred Providers (PP) and government sites.

Analysis of STI data, NACO CMIS: (i) Reporting pattern varied due to expansion of the STI programme and introduction of new CMIS reporting formats; (ii) utilization pattern in some states was high, females were as much as males; (iii) several missed opportunities for syphilis screening noted at STI and ANC sites; (iv) a definite decline in syphilis seropositivity among STI and ANC clinic attendees; (v) higher non-herpetic to herpetic GUD indicated that there is still a preponderance of treatable bacterial STIs in various states.

Conclusions & Recommendations

- a. Strengthen implementation:** (i) Build capacity of TIs for STI service delivery in terms of training, drug procurement, infrastructure, outreach, provider attitudes, and accessibility; (ii) Ensure optimal synergy with NRHM through regular convergence meetings at the National and State levels; (iii) Review and strengthen systems for supportive supervision and monitoring; (iv) Strengthen implementation of 100% syphilis screening and treatment of all ANC women and HRGs; (v) Consider WHO approved point-of-care syphilis testing technologies; (vi) Increase involvement of

ASHA and link workers in STI/RTI programming; (vi) Improve healthcare seeking behaviour by raising awareness of STIs and promoting early treatment; (vii) Strengthen operational research capacities in regional STI research and training reference centres.

Strengthen STI Strategic Information. (i) Strengthen CMIS reporting from all Government, Private, and TI set ups; (ii) For estimation of STI burden for programme planning, set up a working group at the National level to decide on the best possible method using standardized laboratory tests and internationally recommended modelling guidelines; (iii) Besides implementing a basic STI surveillance system in all STI, TI and ANC clinics, adding a small number of priority STI laboratory diagnostic tests to National BSS could provide additional community-based prevalence data; (iv) Formulate a multi-regional, coordinated approach to routine gonococcal antibiotic susceptibility monitoring; (v) Identify research priorities, and follow up studies with standardization of methods, protocols, laboratory tests to assess the impact of interventions; (vi) Establish a small STI working group to regularly review existing programme and research data, make recommendations to ensure programme quality, use of data to inform the national programme, and target interventions to focus on highest risk areas and sub-populations.

Presenting Author	Rajaram S
Title of the Presentation	Levels and trends in HIV and STI prevalence in Bagalkot District based on general population surveys conducted in 2003 and 2009

Rajaram S, Bradley J, Ramesh BM, Washington R, Moses S, Blanchard J, Becker M, Alary M

Background: As a part of the monitoring & evaluation of Avahan, the India AIDS initiative of the Bill & Melinda Gates Foundation, a cross-sectional survey was undertaken in the general population of Bagalkot district in the year 2009. In the year 2003, our team had previously undertaken a general population survey to study the HIV prevalence in the same district. This provides a unique opportunity to examine the levels and trends in HIV and STI prevalence over this time period.

Methods: The repeat survey in the year 2009 was conducted in the same rural and urban areas that were selected in the 2003 study. The study covered 10 rural and 20 urban areas of three talukas in the district namely, Bagalkot, Mudhol and Jamkhandi. However, six urban areas selected from the Bagalkot town had to be replaced in the 2009 survey, due to rehabilitation and resettlement of old Bagalkot town as several major areas were submerged due to flooding from the Almatti reservoir. In both surveys, a target sample of 6600 adult males and females were selected. Urine and blood samples were collected from all consenting participants for HIV and STI testing. An individual was deemed HIV positive if tested positive on two different tests. HIV and STI prevalence over the two periods was compared between the two survey rounds using logistic regression. We also examined the age-wise distribution of HIV prevalence among males and females over the two time points.

Results: Overall, HIV prevalence in the district declined from 3.16 in 2003 to 2.58 in 2009 (see table 1), but the decline over this period was not statistically significant [Odds ratio

(OR) =0.81, p=0.304]. HIV prevalence declined in both rural and urban areas and also among males and females between the two time periods. The prevalence of active syphilis was less than 1 percent and remained the same over the period. However, a slight decline in the prevalence of HSV2 was observed over the period, but the difference was not significant. The age-wise analysis of HIV prevalence indicates a significant decline in HIV prevalence among persons younger than 35 years in urban areas (OR=0.46, p=0.005) and among all women younger than 20 years [OR=0.21, p=0.034]. However, among rural males, we observed a significant increase in HIV prevalence for those who are aged 40 and above [OR=7.86, p<0.001], this level being similar what it was in the younger age group in 2003.

Conclusion: Although, only significant in certain sub-groups, we observed a downward trend in the HIV prevalence in Bagalkot district over the study period. However, we observed a significant increase in the HIV prevalence among rural older males, related to a cohort effect. This effect could have been exacerbated by the increase in survival as a result of the scaling-up of antiretroviral treatment (ART) programs throughout the state.

Presenting Author	Jha P
Title of the Presentation	HIV mortality and infection in India: estimates from nationally representative mortality survey of 1.1 million homes

Jha P, Kumar R, Khera A, Bhattacharya M, Arora P, Gajalakshmi V, Bhatia P, Kam D, Bassani DG, Sullivan A, Suraweera W, McLaughlin C, Dhingra N, Nagelkerke N.

Published in the British Medical Journal: BMJ 2010;340:c621

Background: To determine:

- The rates of death and infection from HIV in India.
- Design nationally representative survey of deaths.

Setting is of 1.1 million homes in India.

Methods: Survey of 123 000 deaths at all ages from 2001 to 2003. Main outcome measures HIV mortality and infection.

Results: HIV accounted for 8.1% (99% confidence interval 5.0% to 11.2%) of all deaths among adults aged 25-34 years. In this age group, about 40% of deaths from HIV were due to AIDS, 26% were due to tuberculosis, and the rest were attributable to other causes. Nationally, HIV infection accounted for about 100 000 (59 000 to 140 000) deaths or 3.2% (1.9% to 4.6%) of all deaths among people aged 15-59 years. Deaths from HIV were concentrated in the states and districts with higher HIV prevalence and in men. The mortality results imply HIV prevalence at age 15-49 years of 0.26% (0.13% to 0.39%) in 2004, comparable to results from a 2005/6 household survey that tested for HIV (0.28%). Collectively, these data suggest that India had about 1.4-1.6 million HIV infected adults aged 15-49 years in 2004-6, about 40% lower than the official estimate of 2.3 million for 2006. All cause mortality increased in men aged 25-34 years between 1997 and 2002 in the states with higher HIV prevalence but declined after that. HIV prevalence in young pregnant women, a proxy measure of incidence in the general population, fell between 2000 and 2007. Thus, HIV mortality and prevalence may have fallen further since our study.

Conclusion: HIV attributable death and infection in India is substantial, although it is lower than previously estimated.

Presenting Author	Kermode M
Title of the Presentation	Opioid substitution therapy in Manipur and Nagaland, north-east India: operational research in action

Armstrong G, Kermode M, Sharma C, Langkham B, Crofts N.

Background: There is good evidence for the effectiveness of opioid substitution therapy (OST) for injecting drug users (IDUs) in middle and high-income countries but little evidence regarding the provision of OST by non-government organisations (NGOs) in resource-poor settings. This paper reports on outcomes of an NGO-based OST program providing sub-lingual buprenorphine to opiate dependent IDUs in two north-east Indian states (Manipur and Nagaland), a region where conflict, under-development and injecting of heroin and Spasmoproxyvon (SP) are ongoing problems. The objectives of the study were: 1) to calculate OST treatment retention, 2) to assess the impact on HIV risk behaviours and quality of life, and 2) to identify client characteristics associated with cessation of treatment due to relapse.

Methods: This study involved analysis of data that were routinely and prospectively collected from all clients enrolled in an OST program in Manipur and Nagaland between May 2006 and December 2007 (n=2569, 1853 in Manipur and 716 in Nagaland) using standardised questionnaires, and is best classified as operational research. The data were recorded at intake into the program, after three months, and at cessation. Outcome measures included HIV risk behaviours and quality of life indicators. Predictors of relapse were modelled using binary logistic regression.

Results: Of all clients enrolled in OST during the month of May 2006 (n=713), 72.8% remained on treatment after three months, and 63.3% after six months. Statistically significant (p = 0.05) improvements were observed in relation to needle sharing, unsafe

sex, incidents of detention, and a range of quality of life measures. Greater spending on drugs at intake (OR 1.20), frequently missing doses (OR 8.82), and having heroin rather than SP as the most problematic drug (OR 1.95) were factors that increased the likelihood of relapse, and longer duration in treatment (OR 0.76) and regular family involvement in treatment (OR 0.20) reduced the likelihood of relapse.

Conclusion: The findings from this operational research indicate that the provision of OST by NGOs in the severely constrained context of Manipur and Nagaland achieved outcomes that are internationally comparable, and highlights strategies for strengthening similar programs in this and other resource-poor settings.

Presenting Author	Rewari BB
Title of the Presentation	Two-year treatment outcomes of patients enrolled in India's national first-line antiretroviral therapy programme.

Bachani D, Garg R, Rewari RR, Hegg L, Rajasekaran S, Deshpande A, Emmanuel KV, Chan PL, Rao KS.

Published in Natl Med J India 2010; 23: 7-12

Background: We aimed to analyse treatment outcomes of patients receiving first-line antiretroviral therapy (ART) through the national AIDS control programme of India.

Methods: Using routinely collected programme data, we analysed mortality, CD4 evolution and adherence outcomes over a 2-year period in 972 patients who received first-line ART between 1 October 2004 and 31 January 2005 at 3 government ART centres. Cox regression analysis was used to identify independent predictors of mortality.

Results: Of the 972 patients (median age 35 years, 66% men), 71% received the stavudine/lamivudine/Nevirapine regimen. The median CD4 count of enrolled patients was 119 cells/cmm (interquartile range [IQR] 50–200 cells/cmm) at treatment initiation; 44% had baseline CD4 count <100 cells/cmm. Of the 927 patients for whom treatment outcomes were available, 71% were alive after 2 years of treatment. The median increase in CD4 count was 142 cells/cmm (IQR 57–750 cells/cmm; n=616) at 6 months and 184 cells/cmm (IQR 102–299 cells/cmm; n=582) at 12 months after treatment. Over 2 years, 124 patients (13%) died; the majority of deaths (68%) occurred within the first 6 months of treatment. Those with baseline CD4 count <50 cells/cmm were significantly more likely to die (adjusted hazard ratio 2.5, 95% confidence interval 1.3–3.2) compared with patients who had baseline CD4 count >50 cells/cmm. Over the 2-year period, 323 patients (35%) missed picking up their monthly drugs at least once and 147 patients (16%) were lost to follow up.

Conclusion: Survival rates of HIV-infected patients on first-line ART in India were comparable with those from other resource-limited countries. Most deaths occurred early and among patients who had advanced disease. Earlier initiation of HIV treatment and improving long term treatment adherence are key priorities for India's ART programme.

Presenting Author	Isac S
Title of the Presentation	Changes in risk behaviours and STI prevalence, following HIV preventive interventions among female sex workers in five districts in Karnataka state, south India

Ramesh BM, Beattie TSH, Isac S, Washington R, Latta J, Reza-Paul S, Blanchard JF, Moses S.

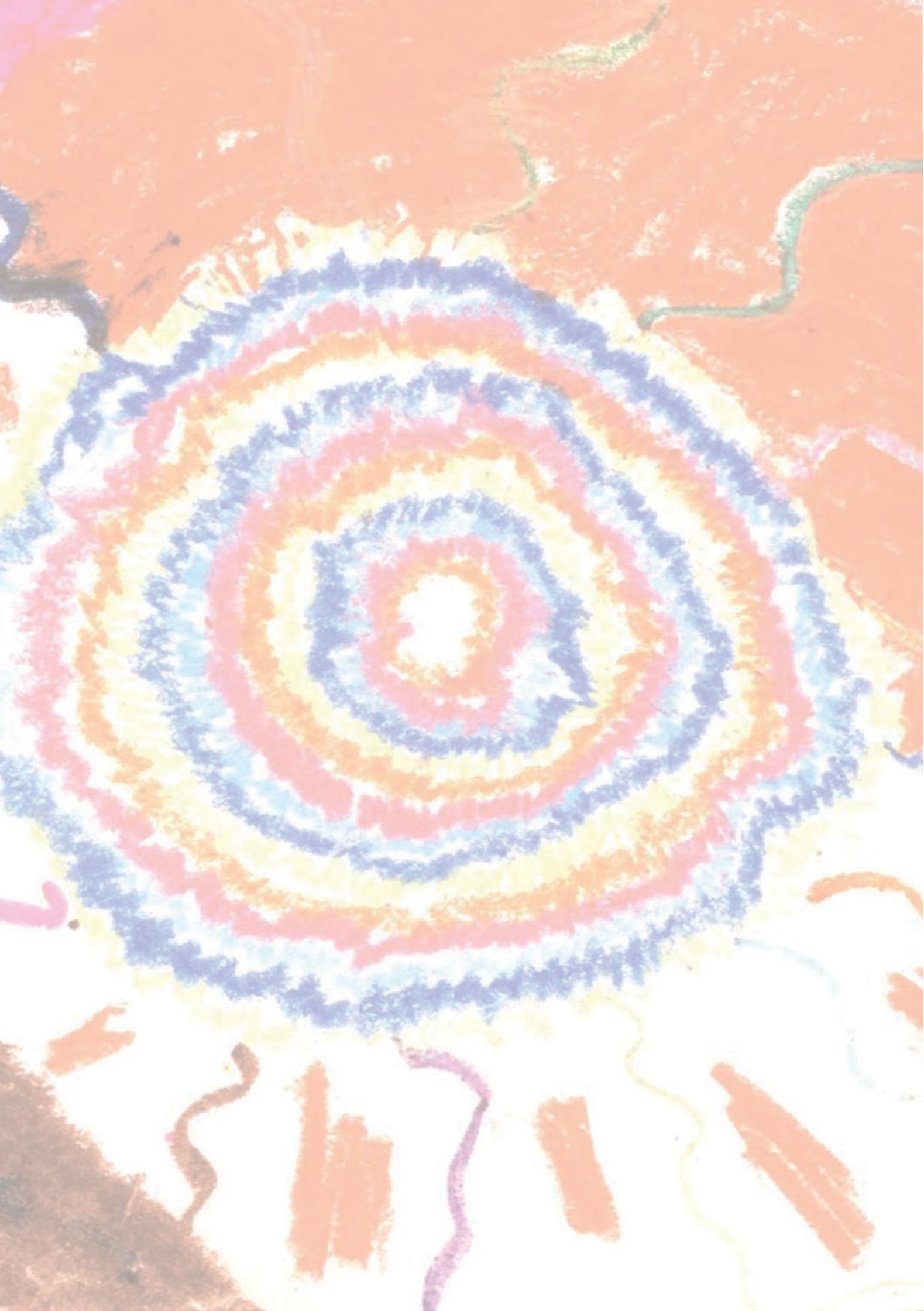
Published in Sexually transmitted infections 2010;86 Suppl 1():i17-24

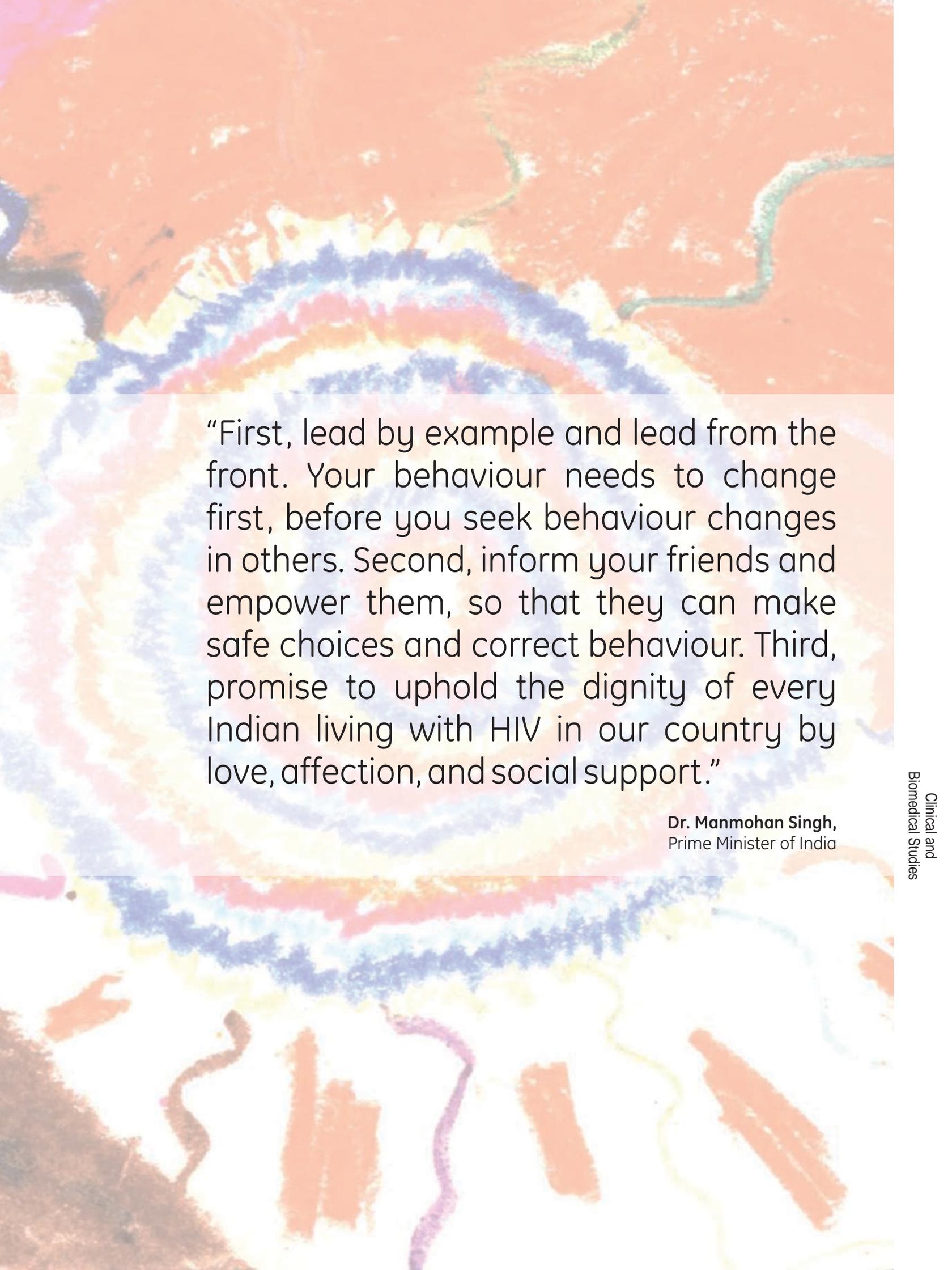
Objectives: To examine the impact of a large-scale HIV prevention programme for female sex workers (FSW) in Karnataka state, south India, on the prevalence of HIV/sexually transmitted infections (STI), condom use and programme coverage.

Methods: Baseline and follow-up integrated biological and behavioural surveys were conducted on random samples of FSW in five districts in Karnataka between 2004 and 2009.

Results: 4712 FSW participated in the study (baseline 2312; follow-up 2400), with follow-up surveys conducted 28-37 months after baseline. By follow-up, over 85% of FSW reported contact by a peer educator and having visited a project STI clinic. Compared with baseline, there were reductions in the prevalence of HIV (19.6% vs. 16.4%, adjusted odds ratio (AOR) 0.81, 95% CI 0.67 to 0.99, $p=0.04$); high-titre syphilis (5.9% vs. 3.4%, AOR 0.53, 95% CI 0.37 to 0.77, $p=0.001$); and Chlamydia and/or gonorrhoea (8.9% vs. 7.0%, AOR 0.72, 95% CI 0.54 to 0.94, $p=0.02$). Reported condom use at last sex increased significantly for repeat clients (66.1% vs. 84.1%, AOR 1.98, 95% CI 1.58 to 2.48, $p<0.001$) and marginally for occasional clients (82.9% vs. 88.0%, AOR 1.22, 95% CI 0.89 to 1.66, $p=0.2$), but remained stable for regular partners (32%). Compared with street and home-based FSW, brothel-based FSW were at highest risk of HIV and STI, despite high levels of reported condom use.

Conclusions: This large-scale HIV prevention programme for FSW achieved reductions in HIV and STI prevalence, high rates of condom use with clients and high rates of programme coverage. Improved strategies to increase condom use with regular partners and reduce the vulnerability of brothel-based FSW to HIV are required.





“First, lead by example and lead from the front. Your behaviour needs to change first, before you seek behaviour changes in others. Second, inform your friends and empower them, so that they can make safe choices and correct behaviour. Third, promise to uphold the dignity of every Indian living with HIV in our country by love, affection, and social support.”

Dr. Manmohan Singh,
Prime Minister of India

Presenting Author	Shah N
Title of the Presentation	Plasma nevirapine levels and antiretroviral efficacy of treatment in HIV-TB co-infected Indian patients receiving highly active antiretroviral therapy along with rifampicin based anti tuberculosis treatment

Sinha S, Dhooria S, Kumar S, Velpandian T, Ravi AK, Kumar N, Ahmad H, Bhargava A, Chug K, Sreenivas V, Sharma SK, Samantaray JC, Mitsuyasu RT.

Objectives: Rifampicin reduces the plasma levels of nevirapine in human immunodeficiency virus (HIV) and tuberculosis (TB) co-infected patients, who are administered these drugs concomitantly. We conducted a prospective interventional study to assess the efficacy of nevirapine-containing highly active antiretroviral treatment (HAART) when co-administered with rifampicin-containing anti tuberculosis treatment (ATT) and also measured plasma nevirapine levels in patients receiving such a nevirapine-containing HAART regimen.

Methods: Antiretroviral treatment naïve HIV-TB co-infected patients with CD4 counts less than 200cells/mm³ were started on rifampicin-containing ATT followed by nevirapine-containing HAART. They were assessed for clinical, immunological and virological response at the end of 24 weeks. Plasma nevirapine levels were measured at day 14 and 28 of starting HAART.

Results: 19 out of 22 (86%) patients were alive at the end of 24 weeks. The CD4 cell count showed a median increase of 88 and 177 cells/mm³ at 8 and 24 weeks of HAART, respectively. Eighty-four percent of patients had viral loads of less than 40 copies/ ml at the end of 24 weeks.

Conclusions: Good immunological and virological response can be obtained in HIV-TB co-infected patients receiving rifampicin and nevirapine concomitantly despite somewhat lower nevirapine trough concentrations. This suggests that rifampicin-containing ATT may be coadministered with nevirapine-containing HAART regimen without substantial reduction in antiretroviral effectiveness. Larger sample sized studies and longer follow-up are required to identify populations of individuals where the reduction in nevirapine concentration may results in lower ART responses or shorter response duration.

Presenting Author	Shet A
Title of the Presentation	Growth retardation and anaemia among HIV-infected children in South India: Need for targeted nutritional interventions.

Shet A, Rajagopalan N, Rameshkumar E, Dinakar C, Indumathi CK, Muthayya S, Kurpad A.

Presented at the 13th International Conference on Infectious Diseases, Kuala Lumpur, June 19-22, 2008.

Background: Growth retardation and anemia are manifestations of paediatric HIV infection and are independent risk factors for death among infected children. We sought to describe nutritional status, anemia burden and HIV disease correlates among infected children in India.

Methods: We analyzed retrospective data from 248 HIV-infected children aged 1-12 years attending four outpatient clinics in South India (2004-2006). Standard WHO definitions were used for anemia, HIV staging and growth parameters. A subsection of children with prospective haemoglobin assessments were also included in the analysis. Statistical analysis included chi square, t test, and univariate analyses.

Results: The overall prevalence of anemia was 62.5%, and 8.1% had severe anemia. (Hb <7 gm/dl) The proportion of underweight and stunted children in the population was 55.3% and 46.2% respectively. Poor growth (WAZ, HAZ < -2) was significantly associated with anemia and advanced HIV disease status ($p < 0.005$). Risk factors for anemia included advanced HIV stage (OR=5.2; CI 2.9-11.2; $p < 0.005$) and severe immunodeficiency (OR=4.5; CI 2.01-10.0; $p < 0.005$). Anemia was independently associated with pulmonary tuberculosis; hemoglobin in those with and without tuberculosis was 8.9 and 10.2 g/dl respectively ($p < 0.005$). Anemia was not significantly associated with age, gender, multivitamins, cotrimoxazole, presence of ART, or ART type (zidovudine versus stavudine). Among 45 anemic children with available prospective data who received at least 6 months of ART along with nutritional supplements, subsequent mean hemoglobin improved significantly by 1.5 gm/dl (CI 0.8-2.3, < 0.005).

Conclusions: The high prevalence and strong interrelationship of growth retardation and anemia among HIV-infected children in India underscores the need for incorporating targeted nutritional interventions during national scale up of care, support and treatment among children.

Table 1: Characteristics of 248 HIV-infected children

Characteristic	Mean/ Proportion
Age	7.2 years
Gender (% boys)	56.5%
Weight-for-age Z score (WAZ)	-1.98
Height-for-age Z score (HAZ)	-1.71
Hemoglobin	10.19 g/dl
CD4 count	582 cells/ul
Underweight (WAZ < -2)	55.3%
Stunting (HAZ < -2)	46.2%
Wasting (weight-for-height Z score < -2)	34.3%
Anemia	62.5%
Severe anemia (haemoglobin < 7g/dl)	8.1%
HIV Staging	
Stage 1 and 2	69%
Stage 3 and 4	31%
Severe immunodeficiency	21.8%
On antiretroviral therapy (ART)	22.6%
HIV/TB co-infection	21.8%

Presenting Author	Shet A
Title of the Presentation	Causes and features of anemia among children with HIV infection in South India

Shet A, Arumugam K, Rajagopalan N, Shubha K, Dinakar C, Shet Arun.

Presented in 2nd World Congress of Public Health Nutrition, Porto, Portugal, Sept 23-26, 2010.

Introduction: Anemia is common in paediatric HIV infection. We sought to study prevalence and etiology of anemia among HIV-infected children in South India.

Methods: HIV-infected children aged 2-12 years were prospectively enrolled from two clinics in 2007-8 and followed for 6 months. WHO definition of anemia was used. CRP >1.0 mg/dl; and soluble transferrin receptor/log ferritin index (sTfR/f) >0.75, indicated inflammation and iron deficiency, respectively.

Results: Among 80 enrolled HIV-infected children, mean age was 6.8 years, 59% were males and 36% were on antiretroviral therapy (ART) for >6 months. Prevalence of anemia was 52.5%. Compared to non-anemic children, anemic children were more likely to be younger (6.4 vs. 7.6 yrs), have a greater degree of underweight (weight Z score -2.5 vs. -1.9) and stunting (height Z score -2.6 vs. -1.9), lower CD4 counts (18% vs. 24%; p<0.01), higher log viral load (11.1 vs. 7.1, p<0.01) and lower serum iron levels (39 vs. 61, p <0.01). Etiology of anemia indicated iron deficiency (ID) alone in 34%, anemia of inflammation (AI) alone in 21%, ID and AI in 7%, Vit B₁₂ deficiency in 7% and unknown etiology in 31%. ART was associated with higher haemoglobin (11.2g/dl vs. 9.8g/dl; p < 0.001). Haemoglobin improved significantly among those who were started on ART (baseline Hb 11.6, 6-month Hb 12.2, p=0.03). Compared to those taking ART alone, children taking ART plus iron supplements experienced a significantly larger increase in haemoglobin (Hb change 1.4; p=0.003). Median iron intake was 5.7 mg/day (interquartile range: 4.2-9.4). Iron intake was below recommended daily allowance levels for all children. There was a significant correlation between iron intake and haemoglobin (r=0.3, p=0.02).

Conclusions: Anemia, particularly iron deficiency anemia and anemia of inflammation, is highly prevalent among children with HIV infection. Enhancement of dietary iron intake along with ART is important for improving haemoglobin in these children.

Presenting Author	Shet A
Title of the Presentation	Conducting mobile phone based HIV health interventions: considerations of perception and design.

Shet A, De Costa A, Rajagopalan N, Kumar K, Rodrigues R, Shubha K, Raj T, D'souza G.

Presented at ICAAP IX, Bali, Indonesia, Aug 9-13, 2009

Introduction: The role of mobile telecommunications technology in enhancing HIV care and adherence is unexplored in Asia. Our objective was to study perceptions and patterns of mobile phone use for HIV care among patients in India.

Methods: We used semi-structured interviews at clinic sites.

Results: Of 322 interviewed, 82% were HIV+ (207 on HAART); 18% were caregivers (median age: 36y, 58% male, 66% urban, 17% illiterate). 74% owned mobile phones; 76% routinely used them (a quarter reported shared usage with family). Non-owners reported inadequate finances and non-requirement of phones. 74% perceived automated reminders as a useful adherence promoting aid. Over 60% desired updates on new drugs and advances in HIV medicine via their phones. Most (90%) did not perceive such use of phones as an invasion of privacy. 79.5% of respondents ($p < 0.005$) favoured the use of mobile phone to contact their HIV healthcare providers, given an opportunity. This is unaffected by phone ownership, age, gender, literacy, HIV disease stage.

Conclusion: There is substantial patient interest in using mobile phones to enhance adherence to HAART, receive HIV information and communicate with the healthcare system. We believe it is feasible to develop a mobile phone-based intervention for HIV healthcare in our context.

Presenting Author	Shet A
Title of the Presentation	Mycobacterium avium complex (MAC) related Immune Reconstitution Inflammatory Syndrome (IRIS) in an HIV-infected Child.

Kuttiatt VS, Dinakar C, Indumati CK, Lewin S, Mishra B, Neogi U, De Costa A, Shet A.

Presented at the Third annual HIV Science Symposium, YRG Care, Chennai, August 29-30, 2010

Background: In resource-limited settings, IRIS is emerging as an important complication of antiretroviral therapy (ART). Data on paediatric IRIS is limited. We report for the first time in India, a child who developed mesenteric lymphadenitis due to MAC shortly after initiating ART.

Description: A four-year-old HIV-infected male child, presented with failure to thrive and intermittent fever for five months. Chest radiogram showed Para cardiac infiltrate, tuberculin test was negative, CD4 count - 223 cells/mm³(6%) and viral load - 3.71×10⁵ copies/ml. Empirical antitubercular treatment (ATT) was started. A month later, ART was initiated. Symptoms improved initially. But one week after ART, he developed high-grade fever and abdominal pain. An oval firm, tender abdominal mass was present. Ultrasonography showed mesenteric lymphadenopathy and needle aspiration yielded acid fast bacilli. CD4 count was 467cells/mm³(12%). Considering the diagnosis of IRIS, prednisolone (1mg/kg/day) was started. ATT and ART were continued. Automated mycobacterial culture showed growth of MAC. Clarithromycin and ciprofloxacin were added, rifampicin changed to rifabutin to provide for specific treatment for MAC. Child became asymptomatic and steroids tapered after one month. Three weeks later, he had recurrence of fever and abdominal pain. Mesenteric lymphadenopathy persisted. Laparoscopic lymph node biopsy showed areas of granulomatous inflammation, necrosis and acid fast bacilli. Recurrent IRIS was considered; prednisolone was restarted and tapered after one month. Specific treatment for MAC was continued for one year. Currently child is asymptomatic, CD4 count - 795 cells/mm³ (20%) and viral load undetectable.

Conclusion: IRIS poses difficult diagnostic challenges. Those patients with severe manifestations benefit from corticosteroids. Stopping ART is rarely warranted.

Presenting Author	Shet A
Title of the Presentation	“Unmasking” Cryptococcal Lymphadenitis: An Unusual Manifestation of HIV- associated Immune Reconstitution Inflammatory Syndrome (IRIS)

Kuttiatt VS, Prarthana BS, Garg I, Shet A

Background: HIV-associated cryptococcal IRIS commonly presents with “paradoxical” manifestations. Data on “unmasking” cryptococcal IRIS is limited. We report for the first time in India, unmasking cryptococcal lymphadenitis in an HIV-infected patient on antiretroviral therapy (ART).

Case report: A 38-year-old previously healthy man presented with weight loss and diarrhea and was diagnosed as HIV-infected (CD4: 59 cells/mm³). First-line ART (zidovudine, lamivudine and nevirapine) was initiated. Six weeks later he developed fever, cough and dyspnoea, and had a palpable right cervical lymph node measuring 1×1 cm. He was treated for respiratory tract infection and improved. After receiving 4 months of ART, his cervical lymph node increased in size (3×2 cm), and was tender although no systemic symptoms or other lymphadenopathy were reported. CD4 count was 139 cells/mm³. Fine needle aspiration cytology (FNAC) of the node showed necrotic debris and organisms resembling cryptococcus (**Periodic acid-Schiff** stain positive). Granulomata, giant cells or acid-fast bacilli were not present. Cerebrospinal fluid examination (CSF) was normal and negative for cryptococcal capsular polysaccharide antigen and fungal culture. Blood culture also showed no growth. A diagnosis of “unmasking” IRIS due to cryptococcus was considered. 2-week course of amphotericin-B followed by 8 weeks of oral fluconazole were given. Anti-inflammatory drugs/steroids were not given. Swelling reduced in size with treatment; the patient became asymptomatic and is currently doing well.

Conclusion: IRIS may present with unusual manifestations. A high index of suspicion leads to early identification and appropriate management. Severe cases may require anti-inflammatory drugs/steroids. Stopping ART is rarely warranted.

Presenting Author	Rajasekaran S
Title of the Presentation	HIV co-infection among multidrug resistant and extensively drug resistant tuberculosis patients: A trend

Rajasekaran S, Chandrasekar C, Mahilmaran A, Kanakaraj K, Karthikeyan DS, Suriakumar J.

Published in JIndian Med Assoc. 2009 May;107(5):281-2, 284-6.

Infection with human immunodeficiency virus (HIV) is found to increase the occurrence of drug resistant tuberculosis. The data for HIV and multidrug resistant tuberculosis (MDR-TB) co infection is scarce in India.

The study aims to find out the prevalence of MDR-TB and extensively drug resistant tuberculosis (XDR-TB) among chronic TB patients and to identify their trend with HIV co infection over time. Non-responding chronic pulmonary tuberculosis patients were selected for the study from 2004 to 2007. They were all subjected to HIV screening and drug susceptibility testing (DST) for anti-TB drugs.

In all 2927 chronic tuberculosis patients were assessed for DST and HIV co infection; 2156 patients (73.7%) had culturable Mycobacterium tuberculosis in their sputum specimens; 1651 patients (56.4%) were found to have drug resistant mutants to one or more anti-TB drugs; 993 patients (33.9%) had MDR-TB and 48 (1.6%) had XDR-TB. Significantly, 17.9% of 1651 patients with drug resistance were found to have fluoroquinolone (ofloxacin) resistant strain. HIV was found to coexist with 141 (14.2%) of 993 MDR-TB patients. Three XDR-TB patients had HIV co infection. The HIV co infection was observed among MDR-TB patients to the tune of 12.3%, 14.7%, 17% and 12.6% during 2004, 2005, 2006 and 2007 respectively ($p = 0.81$). Prevalence of HIV co infection with MDR-TB was found to be high among chronic TB patients.

It would be appropriate to screen all the chronic TB patients for HIV co infection apart from their sputa examined for drug resistant tuberculosis, especially in HIV high prevalent states. Indiscriminate use of fluoroquinolone should be stopped.

Presenting Author	Girish Kumar CP
Title of the Presentation	Carriage of Candida species in oral cavities of HIV infected patients in South India

Girish Kumar CP, Menon T, Rajasekaran S, Sekar B, Prabu D

Carriage of Candida species in oral cavities of HIV infected patients in South India

Published in Mycoses, 2009 Jan;52(1):44-8.

Fifty-four patients with human immunodeficiency virus (HIV) infection were studied to assess the load of oral carriage of Candida spp. The mean oral Candida carriage density (30,305.93 +/- 56,643.93 CFU ml(-1)) in HIV patients was significantly higher than that seen in the control population (93.48 +/- 358.48 CFU ml(-1); P = 0.000). The mean Candida load in HIV patients with oral thrush (46,591.43 +/- 65,002.57 CFU ml(-1)) was significantly higher than in the HIV subjects without oral thrush (306.32 +/- 699.50 CFU ml(-1); P = 0.000). Non-C. Albicans Candida species (56%) were more predominant than the C. albicans (44%) isolates. 25S rDNA PCR analysis of C. albicans revealed preponderance of genotype A strains. Interestingly, 42.6% of rinse specimens grew multiple Candida species, with the combination of C. albicans and C. krusei (39.1%) being the most frequent.

Presenting Author	Bhawani PK
Title of the Presentation	Miliary tuberculosis in human immunodeficiency virus infected patients not on antiretroviral therapy: clinical profile and response to short-course chemotherapy

Swaminathan S, Padmapriyadarsini C, Ponnuraja C, Sumathi CH, Rajasekaran S, Amerandran VA, Reddy M, Deivanayagam CN.

Published in J Postgrad Med. 2007 Oct-Dec;53(4):228-31.

Background: An increase in tuberculosis (TB) incidence has been associated with human immunodeficiency virus (HIV).

Aims: To describe the clinical characteristics and treatment outcome of patients with HIV and military TB treated with short-course intermittent chemotherapy in the absence of access to highly active antiretroviral therapy (HAART).

Settings and design: Prospective study of HIV infected adults referred to a TB clinic between July 1999 and July 2004.

Materials and methods: On diagnosis of military TB, patients were treated with a standard regimen of two months of isoniazid, rifampicin, ethambutol and pyrazinamide followed by four months of isoniazid and rifampicin (2EHRZ 3 /4RH 3) thrice weekly and followed up for 24 months. Patients were reviewed clinically every month and two sputa were collected. Chest radiographs and blood investigations were done at two months, end of treatment and every six months thereafter.

Results: Of 498 patients with HIV and tuberculosis, 31 (6%) were diagnosed as military tuberculosis. At diagnosis, sputum smear was positive for acid-fast bacilli (AFB) in 14 patients (45%) and *Mycobacterium tuberculosis* was isolated in 21 (68%). The mean CD4 cell count was 129 +/- 125 cells/mm³. Twenty-five patients were declared cured at the end of treatment (81%) while one (3%) died and five (16%) failed. The recurrence rate was 19.4/100 person-years and the median survival was 17 months (95% CI 14 to 20). None of the patients received antiretroviral therapy.

Conclusions: Military TB tends to occur among HIV infected patients with severe immunosuppression. Though the initial response to short-course chemotherapy was encouraging, a high recurrence rate and mortality was observed indicating poor prognosis in HIV.

Presenting Author	Rajasekaran S
Title of the Presentation	Immune Reconstitution Tuberculosis in HIV Patients after Antiretroviral Therapy

Rajasekaran S, Vijila, Ravichandran N

Published in JK Science, 2006, 205-7.

Free antiretroviral therapy is being given to eligible people living with HIV in India since April 2004. Government Hospital of Thoracic Medicine, Tambaram Sanatorium, Chennai is one of the largest centers managing HIV/AIDS patients with antiretroviral therapy in India.

This study finds out the incidence of tuberculosis as the manifestation of 'Immune Reconstitution Syndrome (IRS)' after the initiation of Antiretroviral therapy in patients with HIV/AIDS. All the patients, placed under ART, were followed up for the occurrence of tuberculosis from April 2004 to December 2005 at GHTM, Tambaram Sanatorium, Chennai. 2330 HIV patients were initiated antiretroviral therapy till December 2005 and of whom 1409 (61%) were already treated for tuberculosis. 302 (12.9%) had IRS and 81 (3.5%) had tuberculosis, as the component of IRS. Occurrence of tuberculosis as IRS manifestation is significantly high after antiretroviral therapy. This results in starting or restarting anti tuberculosis treatment with the changed or modified antiretroviral therapy in a large number of patients, escalating treatment cost.

Presenting Author	Ramachandran G
Title of the Presentation	Increasing nevirapine dose can overcome reduced bioavailability due to rifampicin coadministration

Ramachandran G, Hemanthkumar AK, Rajasekaran S, Padmapriyadarsini C, Narendran G, Sukumar B, Sathishnarayan S, Raja K, Kumaraswami V, Swaminathan S

Published in J Acquir Immune Defic Syndr. 2006 May;42(1):36-41

Objective: To study the effect of rifampicin on steady-state pharmacokinetics of nevirapine and the impact of increasing the dose of nevirapine on its peak (C_{max}) and trough (C_{min}) levels in 13 HIV-infected patients on regular antiretroviral treatment with nevirapine-containing regimens (200 mg twice daily).

Method: A baseline pharmacokinetic study was conducted and repeated after 1 week of daily rifampicin (450/600 mg). The study was repeated in 7 of 8 patients who had sub therapeutic C_{min} nevirapine levels after increasing nevirapine dose to 300 mg twice daily. Liver function was monitored. Rifampicin caused significant reductions in C_{max} (42%), C_{min} (53%), and exposure (46%) of nevirapine (P <.01). The C_{min} of nevirapine fell below the therapeutic range of 3 microg/ml in 8 of 13 patients. An increase of nevirapine to 300 mg twice daily raised C_{min} to therapeutic range in all 7 patients without exceeding the toxic level of 12 microg/mL. There were no clinical or laboratory adverse events.

Findings: Our findings suggest that decreased bioavailability of nevirapine because of rifampicin coadministration could be overcome by increasing the dose of nevirapine from 200 to 300 mg twice daily without short-term adverse events. Further studies to evaluate the long-term safety of higher dose of nevirapine are required.

Presenting Author	Ramachandran G
Title of the Presentation	Effect of HIV on pharmacokinetics of anti tuberculosis drugs advanced HIV disease

Ramachandran G, Kumar AK, Gurumurthy P, Rajasekaran S, Padmapriyadarsini C, Bhagavathy S, Venkatesan P, Sekar L, Swaminathan S

Published in Contagion 2005;2:182-183.

Background: Acquired Immunodeficiency Syndrome (AIDS) and its associated gastrointestinal complications may impair the absorption of anti-tuberculosis drugs, which results in subsequent treatment failure.

Method: We evaluated the effects of HIV on the pharmacokinetics of anti-tuberculosis drugs by measuring blood levels in patients with advanced HIV disease and diarrhea with and without tuberculosis.

Findings: HIV patients evaluated in our study of the pharmacokinetics of anti-tuberculosis drugs had reduced peak concentrations and exposure of Rifampicin and decreased absorption of Pyrazinamide and Ethambutol; rapid acetylators had decreased Isoniazid levels. It was also found that bioavailability of anti-tuberculosis drugs is decreased in HIV patients with or without tuberculosis who have diarrhea and cryptosporidial infections.

Presenting Author	Ramachandran G
Title of the Presentation	Decreased bioavailability of rifampin and other anti tuberculosis drugs in patients with advanced human immunodeficiency virus disease

Gurumurthy P, Ramachandran G, Hemanth Kumar AK, Rajasekaran S, Padmapriyadarsini C, Swaminathan S, Bhagavathy S, Venkatesan P, Sekar L, Mahilmaran A, Ravichandran N, Paramesh P

Published in Antimicrob Agents Chemother. 2004 Nov;48(11):4473-5.

We evaluated the effects of human immunodeficiency virus (HIV) disease on pharmacokinetics of anti tuberculosis medications by measuring concentrations of isoniazid and rifampin in blood and of pyrazinamide and ethambutol in urine. Peak concentration and exposure were reduced for rifampin, and rapid acetylators of isoniazid had lower drug levels. HIV and HIV-tuberculosis patients who have diarrhea and cryptosporidial infection exhibit decreased bioavailability of anti tuberculosis drugs

Presenting Author	Ramachandran G
Title of the Presentation	Malabsorption of rifampin and isoniazid in HIV-infected patients with and without tuberculosis

Gurumurthy P, Ramachandran G, Hemanth Kumar AK, Rajasekaran S, Padmapriyadarsini C, Swaminathan S, Venkatesan P, Sekar L, Kumar S, Krishnarajasekhar OR, Paramesh P

Published in Clin Infect Dis. 2004 Jan 15;38(2):280-3. Epub 2003 Dec 19.

The absorption of rifampin, isoniazid, and D-xylose in patients with human immunodeficiency virus (HIV) infection and diarrhea, in patients with HIV infection and tuberculosis (TB), in patients with pulmonary TB alone, and in healthy subjects was studied. Percentage of dose of the drugs, their metabolites, and D-xylose excreted in urine were calculated. A significant reduction in the absorption of drugs and D-xylose in both the HIV infection/diarrhea and HIV infection/TB groups was observed ($P < .05$), and the correlation between them was significant. Our results indicate that patients with HIV infection and diarrhea and those with HIV infection and TB have malabsorption of rifampin and isoniazid.

Presenting Author	Ramachandran G
Title of the Presentation	Decreased bioavailability of rifampicin and other anti-TB drugs in patients with advanced HIV disease

Gurumurthy P, Ramachandran G, Hemanthkumar A, Rajasekaran S, Padmapriyadarsini C, Swaminathan S, Bhagavathy S, Venkatesan P, Sekar L, Mahilmaran A, Ravichandran N, Paramesh P

Published in Clinical Pharmacology & Therapeutics 2004, 75, 29.

Background: Malabsorption of drugs from the gastro-intestinal tract due to HIV enteropathy and concurrent infections could lower the bioavailability of anti-tuberculosis (TB) drugs in HIV infected individuals. Our aim was to study the pharmacokinetics of rifampicin (RMP), Isoniazid (INH), Pyrazinamide (PZA) and Ethambutol (EMB) in HIV infected Indian subjects. The D-xylose absorption test was also performed in all the patients.

Method: We studied 13 patients with smear positive pulmonary TB, 13 with HIV & diarrhoea and 14 with HIV & TB. Rifampicin (450mg), INH (600mg), PZA (1500mg) and EMB (1200mg) were administered orally. The plasma levels of RMP and INH at different time points and urinary levels of all drugs/metabolites were estimated.

Results: A significant decrease in peak concentrations of RMP in HIV & diarrhoea and HIV & TB patients was observed when compared to patients with TB, the values being 3.23, 3.27 & 8.27 [μ]g/ml respectively ($P < 0.001$). Significant decrease in AUC of RMP was also observed in HIV patients. The bioavailability of INH was reduced in rapid acetylators in HIV patients with and without TB. The urinary excretion of all four drugs/metabolites and D-xylose was reduced in both HIV groups of patients.

Conclusion: Patients with HIV & TB and/or diarrhoea have decreased bioavailability of first line anti-TB drugs. This could have implications for TB treatment of HIV infected patients.

Presenting Author	Rao AG
Title of the Presentation	Study of Adverse Cutaneous Drug Reactions in HIV positive individuals.

Rao AG, Sudha Rani.C, Padma.P

Background: Adverse drug reactions (ADRs) are costly both in terms of the human illness caused and in economic terms, and can undermine the doctor-patient relationship. ADRs are under-reported and are an underestimated cause of morbidity and mortality. It has been estimated that ADRs represent the fourth to the sixth leading cause of death. Anti retroviral drugs were the single most common cause of adverse cutaneous drug reactions in HIV positive individuals. Frequent reason for cessation of an otherwise effective drug therapy. Confirmatory procedures and laboratory investigations are unreliable and hazardous. Identifying the cause can be difficult if patients are receiving multi drug therapy or more than one potentially causative drug.

Aim: To study the clinical spectrum of adverse cutaneous drug reactions in HIV positive patients.

Objective: To determine the probable causative drug and associated risk factors if any.

Materials and methods: A prospective study comprising of 91 cases drug reactions was carried out from December 2008 to August 2010. All HIV positive patients both inpatients and out patients with adverse cutaneous drug reactions attending the Dermatology department of Gandhi Hospital were included in the study. Patients in whom the possibility of other diagnoses can't be ruled out were excluded. Precise history of drug ingestion including all drugs taken in the recent past, their dosage, time interval between drug administration and clinical manifestations, past history, family history of drug reactions were taken. Thorough clinical examination was carried out and other possible conditions were excluded. The diagnosis was based on Naranjo's algorithm. All the routine investigations were done.

Results: About 76% of the ACDRS occurred in the age group of 20-40 yrs with females outnumbering males, male female ratio 1:1.45. Maculo papular rash was the most common ACDR seen in 76.92% (70 cases) with mean CD4 count of 184 cells/ μ l. Other

ACDRS were EMF(5.49%), SJS(8.79%), Erythroderma(5.49%), FDE(1.09%), others(2.19%).The overall mean CD4 count was 200 cells/ml ART was the commonest cause 75.82%(69 cases). Among ART NNRTI's were the major culprits with Nevirapine accounting for 57.14% and Efavirenz in 9.89% followed by lamivudine 6.6%. Other culprits were cotrimoxazole 5.5% followed by ATT (3.3%), NSAIDS(3.3%). 6patients had sensitivity to both Nevirapine and Efavirenz. In 6 cases (6.6%) the cause of drug reaction was not known.Majority of the ACDR occurred between 10-20 days of initiation of ART. Past history of ACDR was present in 1.09% with pharmacologically different group of drug.

Discussion: Adverse drug reactions are more common among HIV positive individuals than general population probably because of altered immune profile & immune dysregulation. Polypharmacy to deal with opportunistic infections. Increased formation and decreased detoxification of reactive metabolites. In 'post HAART' era, ART replaced the cotrimoxazole, as the commonest cause. Females outnumbered males. Maculopapular rash (76.92%) was the commonest presentation followed by SJS, EMF, and erythroderma. Anti retroviral drugs (75.82%) were the major culprits. There seems to be no correlation between type, severity of drug reaction and CD4 count. Our study results were similar to the study by Dhananjay K.Damle et al except for correlation between type of rash and CD4 count. In our study there seems to be no significant correlation between morphology and severity of rash and CD4 count.

Conclusion: ACDRs contribute to significant morbidity and mortality. Most of the ACDRS are due to ART. ART is like a double edged weapon. It offers the only hope and has potential to prolong the life. At the other edge are drug reactions and toxicities which are the limiting factors to the benefits of ART. By studying the morphology of reaction pattern and the time of appearance, we can have better idea. Most of the drug reactions are maculopapular and attributed to NNRTI (Nevirapine and Efavirenz), and occurs between 10-20 days of initiation of ART. So by carefully monitoring the patients on ART during the initial critical period (10-20 days), one can diagnose and prevent serious complications of ACDRs by early treatment.

Presenting Author	Becker M
Title of the Presentation	Etiology and determinants of sexually transmitted infections in Karnataka state, south India

Becker M, Stephen J, Moses S, Washington R, Maclean I, Cheang M, Isac S, Ramesh BM, Alary M, Blanchard J.

Published in Sexually transmitted diseases 2010;37(3):159-64

Background: Syndromic case management remains the cornerstone for STI (sexually transmitted infection) treatment in many countries. We undertook this study to better understand the etiology of STIs in adults in south India and to inform STI management guidelines.

Methods: Adult males and females presenting with genital complaints were recruited from clinics in Karnataka state, south India. A questionnaire was administered, physical examination performed, and blood collected for herpes simplex virus-type 2 (HSV-2) and syphilis serology. Men with urethral discharge (UD) and women with vaginal discharge were tested for Neisseria gonorrhoea (NG), Chlamydia trachomatis (CT) and Trichomonas vaginalis (TV). Vaginal swabs were also tested for bacterial vaginosis and yeast infection. Participants with genital ulcers were tested for Treponema pallidum (TP), Haemophilus ducreyi (HD), and HSV-2. Human immunodeficiency virus (HIV) testing was offered to all individuals.

Results: There were 401 male and 412 female participants, and rates of HIV infection were high (men, 17%; women, 15%). HSV-2 was significantly associated with HIV in men and women. Among men with the complaint of UD, NG was identified in 35%, CT in 10.5%, and TV in 8.5%. Very little NG or CT was detected among women with vaginal discharge. However, bacterial vaginosis was identified in approximately 40% of women, with significant amounts of TV and Candida also detected. HSV-2 was the most commonly identified pathogen among participants with genital ulcer disease, and the clinical distinction of herpetic versus nonherpetic lesions was not helpful.

Conclusions: Current STI management guidelines should be re-evaluated in south India. Consideration should be given to treating all persons with GUD for both HSV-2 and syphilis, and to adding initial treatment for TV for men with UD in areas of high background prevalence of HSV-2 and TV, respectively. This population is at high risk for HIV, and should be counselled and tested appropriately

Presenting Author	Becker M
Title of the Presentation	Diarrheal disease among HIV-infected adults in Karnataka, India: evaluation of risk factors and etiology

Becker ML, Cohen CR, Cheang M, Washington RG, Blanchard JF, Moses S.

The objectives of this study were to evaluate characteristics associated with diarrhea, the effect of trimethoprim-sulfamethoxazole (TMP/SMX) prophylaxis on diarrhea, the response to treatment with ciprofloxacin and tinidazole (Cipro-TZ), and presence of enteric pathogens. Adults infected with human immunodeficiency virus with and without diarrhea served as cases and controls, respectively. Participants provided a medical history and underwent a physical examination. Blood was collected for CD4 cell counts and stool for culture. Cases were treated with Cipro-TZ. Factors associated with a risk of diarrhea included crowded living and no toilet (all $P < 0.05$). Protective variables ($P < 0.05$) included a CD4 count greater than 200 cells/mm³ and TMP/SMX prophylaxis. Cases were more likely to have a pathogen identified ($P = 0.05$). Eighty-six percent of the cases responded to treatment. Important risk factors for diarrhea were identified. Protection by TMP/SMX reinforces the importance of prophylaxis. These data suggest that treatment with an antibiotic and anti-parasitic medication may be effective.

Presenting Author	Prabhakar B
Title of the Presentation	HIV Seropositives on antiretroviral therapy at Bowring and Lady Curzon Hospital: A Five Year Experience (2004- 2009)

Prabhakar B, Shadaksharappa G, Pavithra HB, Vidyashankar N.

Objectives: To study the spectrum of opportunistic infections, adverse drug reactions and malignancies after long-term highly active antiretroviral therapy (HAART) use among HIV-seropositives at Bowring and lady Curzon hospital.

Methods: Retrospective analysis of data compiled from the records of 2101 HIV seropositives alive and on ART from 2004 to 2009 is described.

Results: The study population included 1248(59.40%) males, 852(40.55%) females and one(0.47%) transgender(Appendix 1). Commonest mode of transmission was heterosexual in 2072(98.61%). Most of the seropositives 1205(57.35%) were in WHO Clinical Stage II at enrolment. The commonest opportunistic infection noted was tuberculosis in 1080(51.40%). 708(33.69%) had pulmonary tuberculosis including one patient with MDRTB. 367 (17.46%) had extra pulmonary tuberculosis and 5(0.24%) had disseminated tuberculosis (Appendix 2). Herpes Zoster in 304(14.5%), Cryptococcal meningitis in 58(2.76%) with 5 patients having dual infection of Cryptococcal meningitis and tubercular meningitis, Pneumocystis pneumonia in 22(1.04%), CMV retinitis in 18 (0.85%) oesophageal candidiasis in 12(0.57%) toxoplasmosis in 11(0.52%) and diarrhoea due to coccidian parasites in 9(0.43%).

A number of adverse effects were also noted consequent to antiretroviral therapy (Appendix 3). Dyslipidemia in 545(25.94%) patients, dyslipidemia with lipodystrophy in 274 (13.04%) and lipodystrophy with normal serum lipid profiles in 142(6.75%). Hyperlactatemia in 119(5.66%), peripheral neuropathy in 94(4.47%), Zidovudine-induced anaemia in 272(12.94%), Zidovudine-induced gastrointestinal intolerance in 17(0.81%), Nevirapine associated rash in 41(1.95%) and Nevirapine-induced hepatitis in 9(0.43%) patients. IRIS was noticed in 28(1.33%). Malignancies occurred in 16(0.76%) patients.

Conclusion: Early and careful monitoring of these Opportunistic infections, toxicities and malignancies is required with the increasing use of HAART in developing countries.

Presenting Author	Prabhakar B
Title of the Presentation	Decreased bioavailability of rifampicin and other anti-TB drugs in patients with advanced HIV disease

Gurumurthy P, Ramachandran G, Hemanthkumar A, Rajasekaran S, Padmapriyadarsini C, Swaminathan S, Bhagavathy S, Venkatesan P, Sekar L, Mahilmaran A, Ravichandran N, Paramesh P

Published in Clinical Pharmacology & Therapeutics 2004, 75, 29.

Background: Malabsorption of drugs from the gastro-intestinal tract due to HIV enteropathy and concurrent infections could lower the bioavailability of anti-tuberculosis (TB) drugs in HIV infected individuals. Our aim was to study the pharmacokinetics of rifampicin (RMP), Isoniazid (INH), Pyrazinamide (PZA) and Ethambutol (EMB) in HIV infected Indian subjects. The D-xylose absorption test was also performed in all the patients.

Method: We studied 13 patients with smear positive pulmonary TB, 13 with HIV & diarrhoea and 14 with HIV & TB. Rifampicin (450mg), INH (600mg), PZA (1500mg) and EMB (1200mg) were administered orally. The plasma levels of RMP and INH at different time points and urinary levels of all drugs/metabolites were estimated.

Results: A significant decrease in peak concentrations of RMP in HIV & diarrhoea and HIV & TB patients was observed when compared to patients with TB, the values being 3.23, 3.27 & 8.27 [μ]g/ml respectively ($P < 0.001$). Significant decrease in AUC of RMP was also observed in HIV patients. The bioavailability of INH was reduced in rapid acetylators in HIV patients with and without TB. The urinary excretion of all four drugs/metabolites and D-xylose was reduced in both HIV groups of patients.

Conclusion: Patients with HIV & TB and/or diarrhoea have decreased bioavailability of first line anti-TB drugs. This could have implications for TB treatment of HIV infected patients.

Presenting Author	Prabhakar B
Title of the Presentation	Incidence of Zidovudine induced anaemia among HIV-Seropositives on ART at Bowring & Lady Curzon Hospital

Prabhakar B, Shadaksharappa G, Pavithra HB, Vidyashankar N.

Objectives: To determine the incidence of Zidovudine(ZDV) induced anaemia and to compare the incidence proportion in patients initially treated with ZDV based regimen with that in patients initially treated with stavudine(d4T) based regimen. To estimate risk of developing ZDV induced anaemia for the second time in patients rechallenged with ZDV based regimen.

Methods: This was a retrospective observational study, with the collation of data from medical records of 112 patients who developed ZDV-induced anaemia after screening for these patients from 2062 longitudinal medical reviews of patients enrolled for ART at Bowring and Lady Curzon Hospital from April 2004 and alive till July 2010. Using a standardized instrument information on patients demographic and clinical conditions, laboratory values and treatments were extracted from the existing records. Body mass index (BMI, weight in kilograms divided by height in meters squared) was used to assess nutritional status. Established cut-off values for BMI were used [19]: normal (BMI \geq 18.5 kg/m²), mild malnutrition (BMI 17–18.4 kg/m²), moderate malnutrition (BMI 16–16.9 kg/m²), and severe malnutrition (BMI < 16 kg/m²).

For all analyses, anaemia was defined as a hemoglobin concentration of less than 10g/dL. Drug-related anemia was defined as a diagnosis of anemia for which the physician specified a drug-related cause in the medical record all other diagnoses were considered unrelated to drugs. Data analysis was performed in Epi Info™ Version 3.5.1 software.

Results: From April 2004 to July 2010, 4290 HIV seropositives were commenced on ART at Bowring and Lady Curzon Hospital. Of these 1081 were transferred to other centers, 585 died and 562 were lost to follow-up, 2062 were alive and on ART. Of the 2062, 1054 were started ART with regimens containing ZDV and 1008 started with d4T based regimens but were substituted to ZDV based regimens consequent to any adverse drug reactions. Among 2062 patients, 112(5.43%) developed anaemia on ZDV based regimens for which the physician specification of drug-related (Zidovudine-related) cause in the medical record were documented. The overall incidence was 8 per person-years. Out of 1054 (51.11%) started on ZDV-based regimen, 84 (8%) patients developed ZDV induced anaemia and out of 1008 (48.88%) started on d4T based regimen 28 (3%) developed ZDV induced anaemia after substituting to ZDV-based regimen. Thus, the incidence proportion was 8% in patients initiating on ZDV based regimen whereas 3% in patients initiating on ZDV who had prior d4T experience. The main baseline and follow-up characteristics of 112 patients is shown in Appendix 1.

In our study population 52% were males and 48% were females. Baseline CD4 count was recorded for all the 112 patients, more than 80% had counts below 200 cells/ μ l. Previous (non-TB) AIDS-defining illnesses(ADIs) were documented in 13% of patients, prior TB in 14%, ADIs and TB in 8% and 24% respectively, at baseline or after commencement of ART. Baseline haemoglobin levels were noted for 112 patients, 19(17%) had grade 1 anaemia, 10(9%) had grade 2 anaemia and 4(4%) had grade 3-4 anaemia.

Median follow-up on ART was 3.25 ± 1.28 years. The median time to stop ZDV-regimens was 103(IQR:73-220) days due to ZDV induced anaemia. Seven patients required immediate blood transfusion to restore their haemoglobin levels. The median duration on d4T-based regimen in patients who were started on d4T-based regimen and later substituted with ZDV-based regimen was 16 months.

In univariate analysis, reason to stop ZDV based regimens within a median duration of 3 months of commencement of ZDV as a result of ZDV-induced anaemia was significantly associated with age > 40 years, CD4 count < 200 cells/ μ l and BMI > 18.0 in patients initiating on ZDV based regimens (Appendix 2).

Out of 112, 39(35%) were rechallenged with ZDV for the second time, of which 13(33%) developed anaemia within a median duration of 3 months on ZDV based regimen while remaining 26(67%) did not develop anaemia over median duration of 8 months on ZDV. Of the 26 who tolerated ZDV on rechallenging for the second time, 10(38%) were males and 16(62%) were females.

Conclusion: Patients initiating ZDV containing regimen are at greater risk of developing ZDV induced anaemia than patients initiating d4T and then substituted to ZDV based regimen. As two-third patients tolerated ZDV on second time substitution, this substitution strategy was observed to be effective as alternative drugs can be preserved for these patients for later use.

Presenting Author	Neogi U
Title of the Presentation	Co-receptor tropism prediction in Indian HIV-1 subtype C sequences: Future Therapeutic implications for India.

Neogi U, Prarthana SB, D'Souza G, DeCosta A, Kuttiatt VS, Ranga U, Shet A

Published in AIDS Res. Ther. 7:24 (21 July 2010) doi:10.1186/1742-6405-7-24.

Presented at AIDS 2010 XVIII International AIDS Conference, Austria, Vienna, 18-23 July 2010.

Background: Recently FDA approved a new class of antiretroviral drug as chemokine co-receptor antagonists which blocks HIV-1 co-receptors preventing entry of HIV into body. Understanding co-receptor tropism of HIV-1 strains circulating in India will provide key analytical leverage for assessing the potential usefulness of these newer antiretroviral drugs among Indian HIV-infected populations. We aimed to characterize co-receptor tropism of HIV-1 subtype C strains isolated from a clinical cohort in southern India, using three different online bioinformatics tools. Furthermore, we aimed to validate this strategy and expand our understanding of co-receptor tropism preference among Indian strains by extending this analysis to a total of 1030 V3 sequences of Indian origin available at Los Alamos databank.

Method: Study has been conducted in Infectious Disease Clinic, St. John's Medical College and Hospital, Bangalore. The V3-V5 region of the HIV-1 *env* gene was amplified and sequenced from 15 antiretroviral naive patients attending the clinic. Three different *in silico* methods were used namely: (i) C-PSSM (<http://indra.mullins.microbiol.washington.edu/webpssm/>) (ii) Geno2pheno [co-receptor] <http://coreceptor.bioinf.mpi-inf.mpg.de/> and (iii) (ds)Kernel <http://>



“India is one of the countries which has made significant reduction in new HIV infections especially over the last ten years.”

Shri. Ghulam Nabi Azad,
Indian Minister of Health and Family Welfare

genome.ulaval.ca/hiv-dskernel/. In addition 1030 V3 sequences were downloaded from HIV-1 Los Alamos Database.

Result: All the 15 clinical isolates were detected as HIV-1 Subtype C. While all the three tools predicted 13 out of the 15 viruses to be R5-tropic, there was disagreement among them with respect to two viral strains. Two strains were detected as X4-tropic when C-PSSM was used for coreceptor tropism prediction. C-PSSM was previously validated in subtype C strains and thought to be more reliable in prediction of co-receptor tropism in HIV-1 subtype C strains. X4-tropic strains were obtained from subjects who had a significantly longer time since HIV diagnosis (96.5 months). R5-tropism was seen in 96.8% of a total of 1045 HIV-1 subtype C Indian sequences.

Conclusions: The present study, the first of its kind from India where a large number of env V3 sequences were subjected to *in silico* co-receptor prediction analysis, revealed high prevalence of R5-tropism and greater homogeneity within the V3 loop sequences of HIV-1 subtype C Indian strains. Although prediction tools may not entirely substitute experimental evaluation, the simplicity of *in silico* strategies highlighted in this study can be a major advantage for coreceptor tropism prediction in resource-constrained settings. Furthermore, our findings also allude to the possibility of including CCR5 antagonists to the anti-retroviral repertoire with additional necessary precautions. The therapeutic implications of our findings are of global relevance and will facilitate further research on HIV-1 co-receptor usage and viral diversity.

Presenting Author	Kabeer BS
Title of the Presentation	Comparison of interferon gamma and interferon gamma-inducible protein-10 secretion in HIV-tuberculosis patients

Kabeer BS, Rajasekaran S, Raja A

Published in AIDS 2010 Jan 16;24(2):323-5.

Interferon gamma (IFN gamma)-based in-vitro assays have suboptimal sensitivity, especially in immunocompromised individuals, which emphasizes the need for alternative markers for tuberculosis (TB) diagnosis. We compared TB antigens-specific IFN gamma and IFN gamma-inducible protein-10 levels in culture of whole blood samples from HIV-TB patients. We report that IFN gamma-inducible protein-10 detects a greater number of HIV-TB cases than IFN gamma and suggest that IFN gamma-inducible protein-10 may be a better alternative marker for latent TB infection diagnosis among immunocompromised individuals.

Presenting Author	Ramachandran G
Title of the Presentation	CYP2B6 G516T polymorphism but not rifampin coadministration influences steady-state pharmacokinetics of efavirenz in human immunodeficiency virus-infected patients in South India

Ramachandran G, Kumar HAK, Rajasekaran S, Kumar P, Ramesh K, Anitha S, Narendran G, Menon P, Gomathi C, Swaminathan S.

Published in Antimicrob Agents Chemother 2009 Mar;53(3):863-8

Background and Objective: The dose of efavirenz during concomitant rifampin (RMP) administration is a matter of debate. We studied the influence of RMP coadministration on the steady-state pharmacokinetics of efavirenz in human immunodeficiency virus type 1 (HIV-1)-infected patients in South India.

Method: Fifty-seven HIV-tuberculosis (TB)-co infected and 15 HIV-1-infected patients receiving combination antiretroviral therapy (CART) with an efavirenz (600 mg once daily)-containing regimen were recruited. HIV-TB-co infected patients were receiving treatment with RMP-containing regimens. A complete pharmacokinetic study was conducted with 19 HIV-TB patients on two occasions (with and without RMP). Trough concentrations of efavirenz were measured in the remaining 38 patients during RMP coadministration. The 15 HIV-infected patients underwent complete pharmacokinetic sampling on one occasion. Plasma efavirenz was estimated by high-performance liquid chromatography, and genotyping of CYP2B6 G516T polymorphism was performed by sequencing.

Findings: Peak and trough concentrations and exposure to efavirenz were significantly higher in TT than in GT and GG genotype patients ($P < 0.001$). Although RMP

coadministration decreased the peak and trough concentrations and exposure to efavirenz by 17.8, 20.4, and 18.6%, respectively, the differences were not statistically significant. The trough concentration of efavirenz was sub therapeutic (less than 1.0 microg/ml) in 6 (8%) of 72 patients. In this South Indian population of HIV-infected patients, CYP2B6 G516T polymorphism but not RMP coadministration significantly influenced the pharmacokinetics of efavirenz; patients with the TT genotype had very high blood levels of efavirenz. While a small proportion of patients had sub therapeutic efavirenz levels, the clinical implications are uncertain, as all had good immunological responses to CART.

Presenting Author	Ramachandran G
Title of the Presentation	Study of ABCB1 polymorphism (C3435T) in HIV-1-infected individuals from South India.

Bakshi S, Ramachandran G, Ramesh K, Hemanthkumar AK, Anitha S, Padmapriyadarsini C, Narendran G, Menon PA, Rajasekaran S, Swaminathan S.

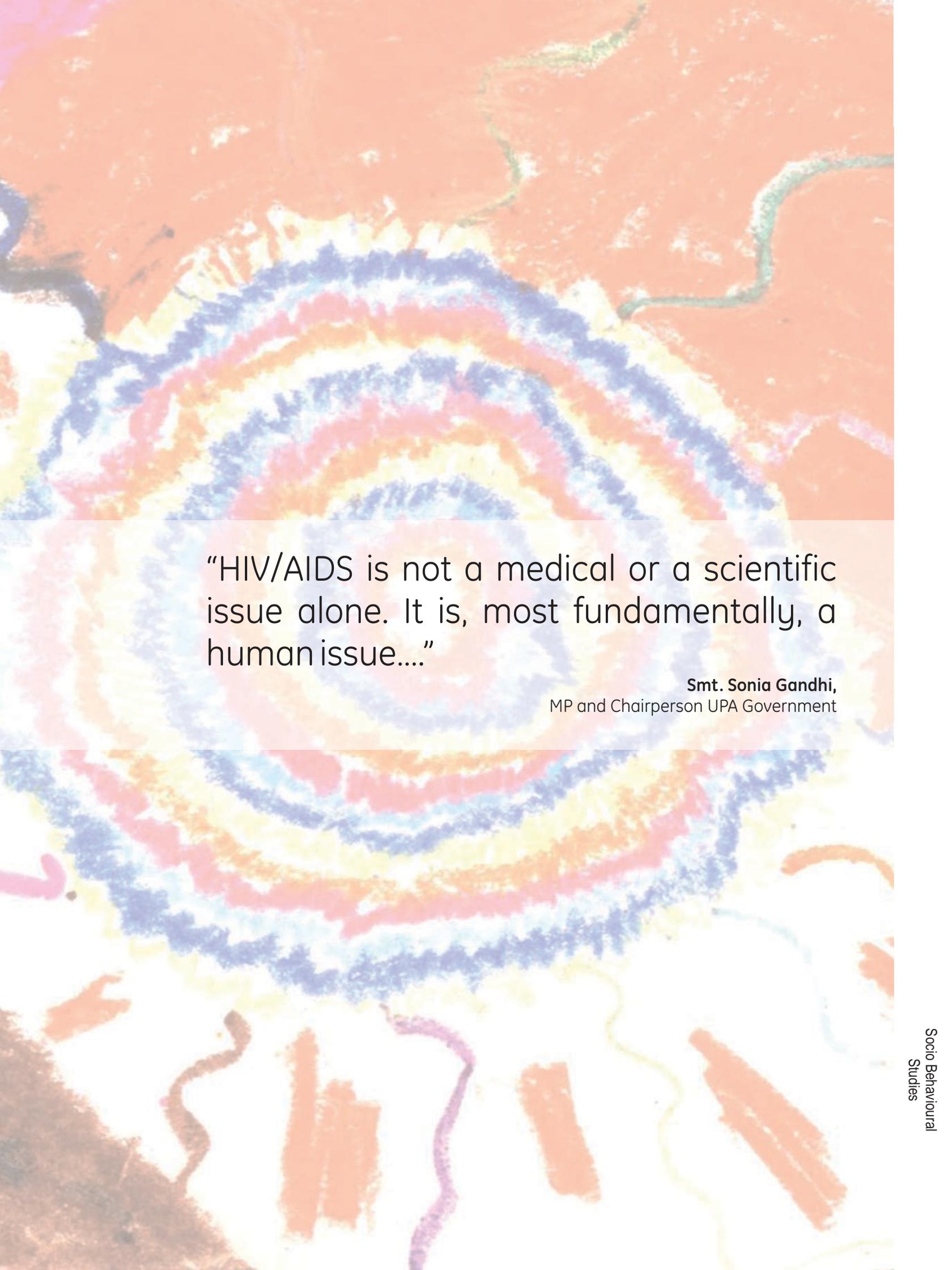
Published in Br J Clin Pharmacol 2008 May;65(5):791-2.

Studies on P-glycoprotein expression and function have revealed that a single nucleotide polymorphism (SNP) in the human ABCB1 gene at 3435 (C > T) results in altered expression and function of P-glycoprotein. There have been reports of lower Nelfinavir and Efavirenz (EFV) concentrations associated with TT genotypes (mutant) of ABCB1 C3435T polymorphism. Frequency distribution of this polymorphism is known to vary across populations. We report the genotype distribution of ABCB1 C3435T in 179 individuals (126 HIV-infected and 53 healthy) from South India. The polymorphism was correlated with plasma 12 h EFV and 2 h Nevirapine (NVP) concentrations in 55 and 71 patients, respectively. Plasma EFV and NVP were estimated by HPLC. Genotyping was carried out by PCR-RFLP.

The number of TT, CT and CC genotypes, respectively, were 78 (44%), 74 (41%) and 27 (15%); C and T allele frequencies were 0.36 and 0.64, respectively. The difference between observed and expected frequency was not significant ($P > 0.05$) and satisfied Hardy–Weinberg equilibrium. This distribution is different from other populations; TT genotypes in the South Indian population were 44%, which is the highest reported so far (21–32% in Caucasians, 1–7% in Africans, 22% in Chinese, 20% in Japanese and 17% in Filipinos). The observed distribution was significantly different from that reported by Schaeffeler et al. in Caucasian, African-American and Japanese populations ($P < 0.05$). The distribution of this polymorphism was similar in patients and healthy subjects. A

limitation of this study was the small sample size. Hence, the allele frequency of this polymorphism needs to be studied in a larger population.

A trend in the plasma EFV concentrations was observed. Patients with the CC genotype had the highest values followed by CT and TT but the differences were not statistically significant. Similar findings have been reported by others. Inter-individual variations in plasma concentrations of EFV could be due to an indirect effect of genetic variations in the ABCB1 gene. This is probably not the only factor, since mutations in the CYP2B6 gene could lead to altered substrate utilization. Our study has shown that plasma NVP did not differ between genotypes, suggesting that NVP concentrations are not governed by genetic variations in the ABCB1 gene.



“HIV/AIDS is not a medical or a scientific issue alone. It is, most fundamentally, a human issue...”

Smt. Sonia Gandhi,
MP and Chairperson UPA Government

Presenting Author	Sogarwal R
Title of the Presentation	A Population Based Survey On HIV Prevalence In Nagaland, India

Bachani D, Sogarwal R, Rao KS

Published in SAARC J.TUBER. LUNG DIS.HIV/AIDS 2009 VI (1) 1-11

The primary aim of the present study was to determine the prevalence of HIV infection in Nagaland and to study knowledge and attitude of study participants towards HIV/AIDS and related Government programs. A population based survey was carried out during April-October, 2007. Stratified sampling technique was adopted with an anonymous, linked design for HIV testing using Dried Blood Spot Testing Method (Tri-Dot). A total of 1965 households were interviewed in which 5661 eligible respondents (male: 15-54 years and female:15-49 years) completed the interview. The total individual response rate was 95.2%. Blood samples were collected from 5637 respondents. Results revealed that the prevalence of HIV was estimated to be 0.74% in Nagaland. Dimapur was identified as the only district where HIV prevalence was higher than 1%. Wokha (0.98%) and Tuensang (0.92%) also had higher prevalence compared to other districts. Knowledge of HIV/AIDS prevention methods and the services available under National HIV/AIDS program was low. Further steps therefore need to be taken to ensure higher utilization of services.

Presenting Author	Sahay S
Title of the Presentation	Psychosocial need and stresses in people infected with HIV/AIDS

Sahay S, Nirmalkar A, Paralikar V, Mate S, Sane S, Mehendale S

Introduction: Since the first report of HIV infection in India in 1986, the country has now one of the largest numbers of people living with HIV/ AIDS (PLWHA). Owing to the mode of transmission specific needs arise in case of PLWHA due to stigma, discrimination, morbidity, mortality and the requirement of life long treatment because the disease is currently incurable. These needs are both social and psychological in nature. These unmet needs lead to stressful conditions, anxiety and depression among PLWHAs.

Anxiety and Depression among HIV test seekers: Initially, in a pilot study conducted we reported anxiety and depression among individuals who came to VCT facility for HIV testing using Hospital Anxiety and Depression Scale (HADS). [Sahay et al, 2007]. Comparison of mean anxiety and distress scores among men and women revealed statistically significant difference in the highest age group category ($p=0.047$ & $p=0.039$ respectively) and reported risk category ($p=0.031$). Only 'highly educated' category showed significant differences across all three mean scores viz. anxiety ($p= 0.002$), depression ($p= 0.003$) and distress ($p= 0.001$).

These findings were important in the context of care and management for people who would turn out to be actually HIV infected. We conducted a study where we tried to test a clinic based intervention of involving significant other of PLHAs to enable disclosure, reduce anxiety and depression among patients. In addition, we also tried to develop a scale to assess mental health needs of the PLHAs in a community based study ($n=680$). The clinic based study component was an experimental study where 126 HIV infected individuals having high anxiety and depression scores were randomized into standard

arm and experimental arm. The participants in the standard arm received standard counselling and testing at each study visit. The participants in experimental arm received the intervention promoting involvement of significant others (SO).

Intervention—the involvement of significant others: To overcome those negative consequences of disclosure, the novel intervention in this study that comprised of eight session training module was developed for patient as well as significant other because the rewards or positive consequences of disclosure can also be substantial.

Impact of involving significant other: A total of 126 individuals participated in the study. There was significant increase in CD4 counts and decrease in psychiatric morbidity among the study participants at the end-line.

Impact of disclosure on well being of PLHAs: Disclosure rate was higher amongst skilled workers as compared to unskilled worker (71.6%, $P=0.35$). Also the rate of holding back is three times higher amongst skilled workers than unskilled workers (odds ratio= 3.52, $P=0.025$). Some of the significant findings are delineated below.

1. Empathy in the significant other was perceived by the index when he/ she reported complete emotional sharing with significant other [$p<0.01$]
2. Level of sharing had impact on relationship between index and the significant other [$p<0.01$]
3. Sharing of complete emotions with the significant other was reported.
4. Greater sharing of one's feelings and emotions increases the possibility of gaining empathy from significant other
5. After disclosure of HIV status by index, the significant other did not withdraw

There is lesser avoidance from significant, hence lesser chances of feeling of isolation among PLHAs

The results indicated that HIV disclosure needs to be done in a systematic process. The spouse may not always be the significant other. Disclosure should be encouraged as disclosure of HIV status is helpful to PLWHAs in getting psychological support. ICTC counsellors can help PLWHAs for making decision for disclosure. A training of the counsellors on disclosure issues is recommended.

Development of NARI Mental Health Needs Scale (NMHNS): The NARI Mental Health Needs Scale (NMHNS) was developed to address specific aspects of mental health experienced by people who were HIV-infected and that are not measured in any commonly used mental health needs scale. NMHNS emerges as 49 items scale, on a four point Likert scale of 0- to- 3 scales. The items were drawn from existing literature and the data from key informant interviews. The items were deemed content valid, easy to understand, and not fatiguing to complete by people with HIV-related mental stress. Cronbach's alpha for the entire tool was 0.959; internal consistency for each of the five subscales was satisfactory. Further testing needs to be done, but we feel that NMHNS has the potential to be a valuable addition to the measurement of mental health needs in HIV seropositive individuals through which appropriate interventions and messages could be improvised to reduce mental health distress among HIV infected individuals in India.

Presenting Author	Edwin SA
Title of the Presentation	Utilization of Private Medical Services by People Living with HIV/AIDS in Tamil Nadu: Willingness to Pay

Bimal C, Edwin SA, Christina DT.

Background: Globally, India ranks third in terms of number of People Living with HIV/AIDS (PLHA) which was estimated to be around 2.31 million in 2007. The number of PLHAs in Tamil Nadu was estimated at 0.18 million which comprises around 10 percent of the HIV burden in India. Due to the relatively higher morbidity level among PLHAs and their frequent vulnerability to opportunistic infections (OIs) and Sexually Transmitted Infections (STIs), the health care needs tend to be greater. Because of the sustained efforts in India, HIV/AIDS testing and treatment services are extensively made available in public health facilities which are generally provided free cost. However, India has a huge private health sector and there are evidences that a greater proportion often seek health care from private providers, including for conditions of public health importance such as STI, HIV/AIDS, malaria and tuberculosis. In fact, private practitioners are often the first point of contact for the rural largely due to their extensive reach and coverage of the population.

Considering the large number of PLHAs and the huge potential of the private health sector, this study aimed at understanding the PLHAs treatment-seeking behaviour, choice of health care providers and their willingness to pay for medical services in the private health facilities.

Methods: The study was conducted in 12 districts of Tamil Nadu. The sampling universe was the people registered in the District-level positive networks and a sample of 667 PLHAs was selected using simple random sampling. The medical services considered for

the study were, out-patient consultation, specialist consultation, in-patient charges per day, basic lab investigations, general medicines for STI and OI management, ART, TB diagnosis (X-ray and sputum diagnosis), HIV testing, lipid profile, renal profile, delivery and minor surgery. The bid structure was used to assess their willingness to pay for the medical services listed above. Respondents were asked to state their willingness to pay for each service from a fixed given amount. The bid price was fixed on the basis of the average amount agreed upon by the private practitioners who are willing to treat PLHAs. In addition to the descriptive statistical analysis, a t-test was done to compare the differences in WTP between two income categories (households with monthly income of less than Rs 5000(approximately US \$110) and those with more than Rs 5000).

Results: According to the study, more than half of respondents (55.6%) were females, 44.2 percent were males and transgender constituted just 0.1 percent. A greater proportion (51.5 %) was in the age group of 25-35 years and 22 percent were in 36-40 years. Majority (92.7%) of them were literates. Around 55 percent were currently married, 30 percent were widows/widowers and the remaining 15 percent were unmarried or separated. About 73 percent reported their monthly income as less than Rs. 5,000(approximately \$110) and the remaining 26 percent reported Rs. 5,000 or more.

The study revealed that 46.5 percent of the respondents approached the private clinics/physicians for treatment, 43.8 percent sought treatment from public health care facilities and 10 percent took medicines on advice of the pharmacists, traditional healers or on their own. While the private health care facilities were mostly sought for special consultation (54%) and OI management (37%), the public facilities were accessed for counselling (67%), advanced lab investigations, ART (92%), delivery (65%), surgery (59%) and STI management (68%). However, majority of them preferred (64%) private health facilities than the public facilities. The major reasons for accessing services from private

sector were good treatment facilities (75%) and lesser waiting hours. Lack of medicines, inadequate lab/treatment facilities, absence of doctors, inappropriate timings, long waiting time and discrimination by doctors/nurses were some of the major reasons for the PLHAs not seeking treatment from public facilities.

On an average, PLHAs spend nearly \$125 annually for medical expenses. Around 10 percent reported an expenditure of approximately \$200 for delivery, surgery and ART. Mostly these were out-of-pocket expenses. However, 93.6 percent of the respondents expressed their willingness to pay for medical services at private sector if costs are subsidized. However, there was a statistically significant difference in willingness to pay between the different income groups. The willingness to pay was more among the higher income group than the lower income group.

Conclusion: Significant proportions of the PLHAs are seeking treatment or prefer treatment from private health care facilities. This emphasizes the need to engage private health care providers and appropriate strategies are to be developed to engage them in order to increase the access and quality of services related to STI, HIV/AIDS. Adequate training to private health care providers on national STI, HIV/AIDS treatment protocols is vital. Subsidizing the cost of treatment and provision of insurance cover to PLHAs could be the few strategies that could motivate PLHAs to seek treatment from the private sector which would subsequently reduce the burden on the public sector. Equally important are strengthening the public facilities and adequate attention to the reasons for not accessing the public health facilities.

Presenting Author	Bradley J
Title of the Presentation	Changes in knowledge and attitudes around HIV/AIDS in the general population of a high HIV risk district in Karnataka

Bradley J, Rajaram S, Shajy I, Moses S, Washington R, Bhattecharjee P, Rani UH, Gajanan, Ramesh BM, Alary M

Background: Despite HIV being present in India for over 20 years, mass media campaigns and programmatic interventions have really only been scaled up in the last 5-10 years. In the last NFHS study (2005/6) only 60% of respondents reported they had heard of HIV/AIDS, although this was much higher than in the previous NFHS survey (1998/9). Knowledge on how to prevent HIV was poor, especially among women. On four indicators of stigma, NFHS Round 3 respondents showed less than positive attitudes.

Some studies have shown that as communities are hit by serious events such as increasing HIV prevalence, a kind of cultural inertia results whereby existing trends towards more liberalized views are stalled, and there is a resurgence of less progressive views, particularly among the youth. We examined changes in knowledge and attitudes around HIV in Bagalkot district, Karnataka where in 2003, we found a general population HIV prevalence of 2.9%. There have been multiple coordinated interventions in this district, for high risk groups and mobile populations, care and treatment, as well as general community interventions such as Stepping Stones. The intent of these programmes was to reduce HIV risk behaviours, as well as address the knowledge and attitudes around gender and sexuality that might contribute to HIV susceptibility and enable people living with HIV to be accepted in the community.

Methods: After a full population census with which to form a sampling framework, general population surveys were conducted in 2003 and 2009, interviewing 6,600 randomly sampled men and women in the same 10 villages and 20 urban blocks (6 new blocks had to be substituted in 2009 due to flooding/evacuation of whole block areas). Questions about HIV knowledge, sexuality, gender and condoms were included.

Results: There was a significant increase in awareness of HIV, from 72.7% of people in 2003 to 84.2% in 2009, mostly accounted for by women gaining more information.

Condom awareness increased dramatically from 29.7% to 60.3% of respondents, and the proportion who had had an HIV test increased from 5.7% to 18.6%, with the increase greatest among women, increasing from 4.8% to 27.1%. Questions were asked about prevention of HIV infection. Only 10% in both surveys mentioned abstinence and there was a fall in the number mentioning faithfulness to one partner (40.9% vs. 26.5%). However, use of condoms was mentioned more in 2009 than 2003 (10.8% vs. 26.2%). In both years, there was almost the same number reporting the importance of avoidance of injections, razor-sharing and blood transfusion as there was mentioning condom use in 2009. Those thinking that people should avoid sex with sex workers fell from 13.89 to 8.1%.

The survey showed that attitudes to people living with HIV improved tremendously over the 6 years. The number of people thinking that HIV is a punishment from God fell from 43.6% to 28.9%; those thinking that people with HIV should be thrown out of the community fell from 41.6% to 27.9%; those thinking that children with HIV should have separate schools fell from 41.8% to 28.1%; and those thinking that one should not take a bride from a family where someone has HIV fell from 49.5% to 32.1%. However, despite this reduced level of stigma and increased caring, there appeared to be little change in the “a blaming the victim” attitude: the number of people who thought that people who have sex outside marriage deserve to get AIDS, remained around the same at 61.6% in 2003 and 60.7% in 2009. Similarly, there were similar proportions in 2003 and 2009 of people who thought sex workers should be tested compulsorily for HIV – 81.9% vs. 83.7%.

Despite more discussion about AIDS in the community, there was an increase in the proportion of respondents who thought that talking about AIDS within the family was not respectable (21.4% vs. 25.2%). There was also an increase in the number of people who thought that it is wrong to talk about sex (21.7% vs. 27.8%). The proportions of young people (aged 15-24) who thought this also increased from 22.1% to 28.6%. Common misconceptions about the consequences of discussing sexual issues increased. Those thinking that sex education increases promiscuity rose from 19.4% to 30.7%. Young people were very likely to think this (16.7% vs. 28.7%). On the other hand, on issues such as female sexuality, there appeared to be a growing acceptance of such things as women having a right to enjoy sex – only 21.6% agreed with the statement that it was

immoral for a women to seek pleasure in sex in 2003 and this fell to 15.4% in 2009. Masturbation seems to remain a subject around which many misconceptions remain. The proportion who thought this practice harmful to health rose from 36.4% in 2003 to 40.2% in 2009. with again, the biggest increase in misinformation occurring in the youngest age group, where this increased from 30.2% to 39.5%.

Attitudes to condoms were ambiguous. Although slightly more people in 2009 thought it OK for women to suggest condom use (61.8% vs. 66.5%), more prudish views about condom use were also apparent. For example in 2003, 14.8% thought it improper for a respectable person to talk about condoms; this rose to 28.3% in 2009. Similarly 30.2% of respondents in 2003 thought that easy accessibility to condoms would promote promiscuity, compared to 44.5% in 2009, a view held across all age groups.

Conclusions: Our study shows significant improvements in awareness about HIV/AIDS, condoms, testing for HIV and use of condoms to prevent HIV transmission. However, the overall levels of prevention methods were still poor in 2009 in the general population. There had clearly been a shift in attitudes towards PLHIV in terms of more caring attitudes and reduction in stigma, even though intolerance and blame for the behaviours that might have led to HIV appeared to have increased. Similarly, although there was more awareness of issues and condom use, more people, especially younger people who are usually the ones to advance progressive ideas about sexual issues, expressed more regressive views in 2009 around sexuality, promiscuity, gender and talking about issues relating to sexuality and HIV.

Presenting Author	Kumar MM
Title of the Presentation	Advocacy Strategies For Recruitment Of Volunteers For Phase I HIV Vaccine Trials In Chennai, India

Kumar MM, Ramanathan VD, Samuel AN, Manogaran C, Lakshmi D, Johnson SL, Vasudevan A, Krishnan A, Solomon S, Kochhar S and Goyal R

India has conducted three phase one AIDS vaccine trials using Adeno Associated Virus as a single dose vaccine, Modified Vaccinia Ankara (MVA) in homologous prime boost and TBC M4 and ADVAX-MVA TBC M4 heterologous prime boost regimens. The last two trials have been conducted in Chennai, in Southern India recruiting a total of 48 healthy, non HIV infected, at low risk for HIV infection volunteers. These volunteers were recruited by advocacy activities involving various community groups directly, addressing educational institutions, corporate and industrial establishments. In addition, the press and the mass media (radio and television) were also involved in the advocacy and recruitment process. The general level of knowledge regarding AIDS, reasons for volunteering for HIV vaccine trial and their continued motivation in participation were assessed in these 48 volunteers (22 women) from various walks of life. The findings from these trials indicate that a greater awareness regarding basic facts about AIDS and the role of media in spreading the knowledge are important factors which will definitely help future vaccine trial processes.

Presenting Author	Chandrashekhar R
Title of the Presentation	Perceptions of Women living with AIDS in Rural India related to the Engagement of HIV-Trained Accredited Social Health Activists for Care and Support

Nyamathi AM, Williamb RR, Ganguly KK, Sinha S, Heraviand A, Albarrán CR, Thomas A, Greengold B, Ekstrand M, Ramakrishnaa P, Rao PR.

Published in Journal of HIV/AIDS & Social Services, 9: 4, 385 – 404

A community-based participatory research study was conducted using focus groups with 39 women living with AIDS (WLA) in the rural setting of Andhra Pradesh, India. In addition, three nurses, two physicians, and five reproductive health accredited social health activists (ASHAs) took part in focus groups. The WLA offered insight into the benefits of HIV-trained ASHAs including emotional support, assistance with travel to health care providers and antiretroviral therapy medication adherence. Health care providers also identified benefits of using HIV-trained ASHAs and suggested modalities for how to train these individuals. These findings will contribute to the design of a future program of care involving HIV-trained ASHAs.

Presenting Author	Arora P
Title of the Presentation	Male use of female sex work in India: A nationally representative behavioural survey

Gaffey MF, Venkatesh S, Dhingra N, Khera A, Kumar R, Arora P, Nagelkerke N, Jha P

Background: Heterosexual transmission of HIV in India is driven by the male use of female sex workers (FSW), but few studies have examined the factors associated with using FSW.

Methods: We use data from the nationally representative Behavioural Surveillance Survey conducted in the general population in 2006 to examine the prevalence and correlates of FSW use among 31,040 men aged 15-49 years. We also estimate the absolute number of men using FSW in India in 2006. Analyses were stratified by HIV prevalence in pregnant women: high-HIV states are Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu; low-HIV states are all remaining states, excluding the north-eastern states.

Results: Nationally, 4% of men used FSW in the previous year, representing about 8.5 million FSW clients. Unmarried men were far more likely than married men to use FSW (prevalence ratio [PR]=8.0), but more than half of all FSW clients were married. FSW use was higher among men in the high-HIV states than in the low-HIV states (PR=2.7), and half of all FSW clients lived in the high- HIV states. The risk of FSW use rose sharply with increasing number of non- regular partners in the past year.

Conclusions: Given the large number of men using FSW, interventions for the much smaller number of FSW remains the most efficient strategy for curbing heterosexual HIV transmission in India.

Presenting Author	Arora P
Title of the Presentation	HIV, HSV-2 and syphilis among married couples in India: Patterns of discordance and concordance

Arora P, Nagelkerke N, Sgaier SK, Kumar R, Dhingra N, Jha P

Background: Differences in sexual networks likely explain the disparity in the scale of HIV epidemics in sub-Saharan Africa and India. HIV and sexually transmitted infection (STI) discordant couple studies provide insights into important aspects of these sexual networks. We wished to quantify the role of male sexual behaviour in HIV transmission in married couples.

Methods: We analyzed patterns of HIV and STI discordance in married couples from two community surveys in India: the National Family Health Study-3 for HIV-1 and the CGHR health check-up for HSV-2 and syphilis. A statistical model was used to estimate the fraction of infections introduced by each of the two partners.

Results: Only 0.8%, 16.0% and 3.5% of couples were infected with HIV-1, HSV-2, and syphilis respectively. A large proportion of infected couples were discordant (73.1%, 55.0% and 84.2% for HIV-1, HSV-2, and syphilis, respectively). Among couples with any STI, the male partner introduced the infection the majority of the time (HIV-1: 85%, HSV-2: 62%, syphilis: 75%).

Conclusions: Male infidelity appears to be the driving force of the Indian HIV/STI epidemic. Male client and female sex worker contacts should remain the primary target of the National AIDS Control Program in India.

Presenting Author	Nanda P
Title of the Presentation	What Impede Universal Access for Women and Girls in India? A study of Female Sex Workers in Pune

Nanda P, Das M, Mukherjee S, Nayak H and Singh R

Background: The most recent estimates from 2007 suggest that the national adult HIV prevalence in India is approximately 0.34 percent, amounting to 1.8 to 2.9 million people living with HIV in India (NACO 2008). Of these, an estimated 39 percent are women. The overall HIV prevalence among different population groups in 2007 continues to portray a concentrated epidemic in India, with a very high prevalence among High Risk Groups. The Indian HIV epidemic has however expanded to non high-risk groups that include adolescent girls (married and single); married women of reproductive age; sexually active single women; pregnant women; and women survivors of gender based violence, such as sexual abuse and rape (NACO 2008). Statistically these groups still do not manifest high HIV prevalence. However these trends point to their vulnerability to HIV and therefore the need to consider these groups in any analysis of understanding barriers to access HIV services.

The project Universal Access for Women and Girls Now is a global initiative to reinvigorate progress towards achieving universal access to HIV prevention, treatment, care and support (universal access) and Millennium Development Goals (MDGs) focusing on women and girls and their access to HIV services. The aim of the initiative is to significantly accelerate progress towards meeting the specific universal access targets for women and girls by ensuring full integration of key gender actions into national AIDS strategies and plans.

Based on the review of the literature from India, despite many research studies, what is still not adequately understood is a comprehensive understanding of barriers (perceived and actual) to HIV prevention, testing and treatment services for women and girls in different settings of risk and vulnerability. We have chosen to select on key vulnerable group of women and our study will focus on the barriers that impede women's access to HIV services in particular for female sex workers.

Objectives: The specific objectives of the study are:

- To understand the nature of prevention and treatment seeking behaviour for STI and HIV among the brothel and non-brothel female sex workers;
- To build an understanding of multiple barriers that women in select settings experience in accessing HIV related services.

Methodology: A cross sectional quantitative survey was undertaken with female sex workers in Pune. For selection of sex workers in brothel – based areas, a two-stage systematic sampling procedure has been used. The list of female sex workers by household for each of the lane has been collected from the NGOs working on the ground as the base for sample selection. Selection of sex workers in the non-brothel areas, a time location sampling procedure was followed. The total sample size for brothel and for non-brothel based sex workers is 154 and 175 respectively.

The Pune site where the study focused to understand the different types of barriers from the female sex workers is under the targeted interventions of India's National AIDS response.

Results: The findings of the study on barriers and facilitators, the female sex workers face present some interesting insights. While prevalence of STI among the female sex workers is high at 71%, only three-fourth of them who experience symptom in the last 12 months reported seeking treatment. Majority of this group received only counselling and not any diagnostic tests or medication at the point of STI treatment.

There is universal knowledge of HIV among this group. Being a targeted intervention area, 100 percent condom use is reported by female sex workers with their regular partner and clients, while half of them reported use of condoms with their husbands. Interestingly only 67 percent reported that use of condom can prevent HIV infection. This suggests while use is high, a precursor to use, i.e. knowledge on prevention is not universal.

Ninety percent of the female sex workers had got tested for HIV in last 12 months before the survey and two-third of them availed these services from an NGO clinic in their area. Clearly proximity to health centers with free service is a determinant of HIV testing. The study also shows that female sex workers do not avail services from centers where they

are easily identified as sex workers. Though the HIV testing seems almost universal in this population however the awareness of anti-retroviral treatment (ART) is as low as only 22 percent among those female sex workers who underwent testing in the last 12 months.

Two-third of female sex workers reported discriminating attitude of health practitioners because of their profession when they access services. Sixty-one percent also believe that health worker reveals their identity and ridicule them openly. Interestingly, 64 percent of female sex workers reported that they are asked to go for a STI or/and HIV test when they fall ill, irrespective of type of illness. As known through earlier studies, this study also found that a wide spread physical violence by state authorities followed by violence by the clients and the brothel madams or pimps.

Conclusion: The study clearly suggests that NGO driven targeted interventions have made great strides in providing essential HIV services to sex workers, who almost completely rely on these services. On the other hand, there is high reporting of self stigma, discrimination, fear about knowing their HIV status, poor knowledge of ARTs, and high violence in their lives, contributing to a high level of isolation and vulnerability. Further programmatic effort needs to linkages with supportive structures, such as access to legal services, and other efforts to ameliorate violence in the lives of sex workers. In addition, there need to more efforts to address stigma (self and institutional) and build knowledge on treatment options for HIV/AIDS. Sex workers knowledge around safe sex practices need to be improved so that they are able to negotiate condom use even if the NGO interventions were not there. There are related questions around sustainability of community based organization providing bulk of these services to Female sex workers and how they could roll over these efforts to other public and private sector services over the long term.

Presenting Author	Blankenship KM
Title of the Presentation	Power, community mobilization, and condom use practices among female sex workers in Andhra Pradesh, India

Blankenship KM, Brooke SW, Trace SK and Monica RB

Published in AIDS, 22, S109-S116.

Background: Research has continued to show that HIV prevention interventions for female sex workers (FSW) in India must go beyond health education, screening and treatment for sexually transmitted infections (STI) and condom promotion and distribution. Addressing the multiple contextual, historical and structural factors that promote and perpetuate risk for FSW remains crucial for successful prevention interventions. We used a structural interventions framework to analyze the associations between power and condom use among a sample of female sex workers, and how exposure to a local community mobilization intervention (CMI) affects these associations.

Methods: Data was obtained from a cross-sectional survey of 812 FSW in the East Godavari district of Andhra Pradesh, India, recruited through respondent-driven sampling. We identified three types of power - collective power, control over work, and economic power, and three dimensions of collective power - collective identity, efficacy, and agency. Multivariate logistic regression analysis was used to analyse the relationship of these three types of power and exposure to a CMI with consistent condom use with clients.

Results: A total of 803 respondents exchanged sex with an occasional or regular client in the 7 days before the interview. Multivariate logistic regression shows that control over

both the type of sex [adjusted odds ratio (AOR) 1.70, 95% confidence interval (CI) 1.23-2.34] and the amount charged (AOR 1.56, 95% CI 1.12-2.16), and economic dependence (AOR 0.54, 95% CI 0.35-0.83) are associated with consistent condom use as is programme exposure (AOR 2.09, 95% CI 1.48-2.94). The interaction between programme exposure and collective agency was also significant (chi-square 6.62, $P = 0.01$). Among respondents who reported both programme exposure and high levels of collective agency, the odds ratio of consistent condom use was 2.5 times that of other FSW.

Conclusion: A structural interventions framework is useful for understanding HIV risk among FSW. More needs to be done to promote FSW control over work and access to economic resources.

Presenting Author	Reed E
Title of the Presentation	Migration/mobility and risk factors for HIV among female sex workers in Andhra Pradesh, India: implications for HIV prevention

Reed E, Gupta J, and Blankenship KM

Background: While there has been much research on male labour migrants, far less work has been devoted to the investigation of the relationship between HIV risk and mobility among other vulnerable groups impacted by India's HIV epidemic, including female sex workers (FSW). This paper aims to examine the relation between high mobility/migration (sex work in three or more villages/towns within the past year) and HIV risk factors among a sample of FSW in Andhra Pradesh, India.

Methods: FSW at least 18 years of age (n=673) were recruited through respondent driven sampling for a survey on HIV risk. Adjusted logistic and linear regression models assessed high mobility in relation to sexual and physical victimization, STI symptoms and treatment, condom use and negotiation, number and/or types of sex trades, number of clients, and number of days worked.

Results: Twelve percent (n=82) of FSW were highly mobile. FSW with high mobility were more likely to report recent HIV risk factors: sexual violence (Adjusted Odds Ratio (AOR)=5.2; 95% Confidence Interval (CI): 3.0-8.9), physical violence (AOR=1.7; 95%CI: 1.1-2.7), unprotected sex for more money (AOR=1.7; 95%CI: 1.1-3.0), at least one STI symptom (AOR=1.9; 95%CI: 1.1-3.1), a greater number of vaginal sex trades ($\beta=3.9$, $p=0.003$) a greater number of clients ($\beta=2.5$, $p=0.02$), and anal sex with clients (AOR=2.4; 95%CI: 1.4-4.1).

Conclusion: Findings from this study underscore the violence and HIV related vulnerability faced by mobile/migrant FSW and highlight the need to inform and tailor related prevention strategies.

Presenting Author	Reed E
Title of the Presentation	The Context of Economic Insecurity and Its Relation to Violence and Risk Factors for HIV Among Female Sex Workers in Andhra Pradesh, India

Reed E, Gupta J, Biradavolu M, Devireddy V and Blankenship KM

Published in Public Health Reports, 125 (Suppl 4): 81-89

Background: Dire socioeconomic status is often cited as a primary motivation for women's participation in sex work and the urgency involved with disparaged economic conditions often lead to unprotected sex with clients and associated risk for human immunodeficiency virus (HIV). We examined the context of economic insecurity and debt among female sex workers (FSWs), how this context varies among FSWs, and its association with experiences of violence and sexual risk factors for HIV.

Methods: We recruited FSWs aged 18 years ($n=673$) through respondent-driven sampling for a survey on HIV risk in this region. Using logistic regression models (adjusted for partner status, education, financial support, and literacy), we assessed the relation between debt and sexual and physical victimization as well as sexual risk. We also conducted qualitative interviews with a subsample of the survey participants and examined these for related themes.

Results: In adjusted logistic regression models, FSWs who reported debt were more likely to report the following: recent physical violence (adjusted odds ratio [AOR] = 2.4, 95% confidence interval [CI] 1.5, 3.9), unprotected sex with occasional clients in the past week (AOR=2.3, 95% CI 1.2, 4.3), anal sex with clients in the past 30 days (AOR=2.0, 95% CI 1.1, 3.9), and at least one sexually transmitted infection symptom in the past six months (AOR=1.6, 95% CI 1.1, 2.4). FSWs with debt were more likely to report current husbands or other male partners, and less likely to report condom use with these partners, further increasing their sexual risk. Qualitative data elaborated on these findings.

Conclusion: Findings indicate the violence- and HIV-related vulnerability of FSWs who report debt and further highlight how male partners may contribute to the debt and economic insecurity of FSWs.

Presenting Author	Blankenship KM
Title of the Presentation	Challenging the Stigmatization of Female Sex Workers through a Community Led Structural Intervention: Learning from a Case Study of a Female Sex Worker Intervention in Andhra Pradesh, India

Blankenship KM, Biradavolu MR, Jena A and George A

Issues: Structural interventions represent a potentially powerful approach to HIV prevention among female sex workers (FSW) that focus on changing the social context of risk rather than individual behaviour. Community led structural interventions (CLSI) represent a particular form of structural interventions whereby the collective energy of FSW is directed towards action to address the contextual factors that promote their risk. Among the different contextual factors that contribute to FSW vulnerability to HIV, and that may be the target of CLSI, are social norms that stigmatize them and their work.

Description: Drawing from ethnographic data collected as part of an ongoing analysis of the implementation and impact of a CLSI being implemented in coastal Andhra Pradesh, India, we present a case study of the challenges and opportunities faced by a CLSI seeking to confront stigmatization of FSW through its interactions with a government sponsored AIDS education program targeted to the general public. The government program promoted slogans that stigmatized FSW by attributing HIV/AIDS to them.

Lessons learned: Through participation in the program, the CLSI was complicit in promoting this same stigmatization. Yet it also used participation in the program as an opportunity to raise awareness among FSW of the CLSI and to mobilize FSW. In addition, the CLSI organized an alternative public rally, outside of but parallel to the government program, where they reframed FSW not as the carriers of HIV but as public health workers combating it.

Next steps: With this case study, we suggest that CLSI for HIV prevention among FSW are implemented in a context of inequality that constrains their actions, but they can still employ strategies that have the potential to transform that context.

Presenting Author	Saggurti N
Title of the Presentation	HIV Transmission in Intimate Partner Relationships in India

Saggurti N, Malviya A

Background and Objectives: The HIV epidemic in India is moving into a phase where new infections are increasingly occurring within intimate sexual partner relationships. In 2008, women constituted 38 percent of the total HIV-infected population. This figure was only 21 percent in 2001. More than 90 percent of these women acquired HIV infection from their husbands or their intimate sexual partners. They are at increased risk of HIV not due to their own sexual behaviour but because they are partners of men who belong to most-at-risk population groups i.e. clients of sex workers, men who have sex with men and injecting drug users. The fact that HIV infections among women within marriage and/or in other intimate partner relationships have increased over the past decade and the fact that we have limited understanding of the reasons for such increase provided the impetus for this review. The overall goal of the review was to identify the data gaps in the existing literature on HIV transmission in intimate partner relationships and suggest potential programmatic entry-points to reduce the incidence of HIV infection in women. The specific aims are: 1) to review the available data and the literature related to HIV transmission in intimate partner relationships and identify the data gaps; 2) to review the national response for reducing HIV transmission in intimate partner relationships; and 3) to identify potential programmatic entry-points for the prevention of HIV transmission in intimate partner relationships.

Methods: A comprehensive electronic literature search of various academic journal websites, websites of international agencies and standard internet search engines was carried out to identify all Indian studies available in the public domain that were (even remotely) related to HIV transmission in intimate partner relationships. Additional information was gathered by organising two consultative meetings with members from HIV-positive network groups in India (namely Positive Women Network [PWN+] and Indian Network of Positive People [INP+]). Guidance on the frame-work for review was provided by an advisory committee that included experts from UN organisations, academicians and programme managers from government and non-governmental organisations.

Results: Data from the National Family Health Survey (NFHS-3) reveal that in one out of every 200 married couples in the country; at least one or both partners are infected with HIV. In four out of every thousand married couples only one of the partners is infected. Further analysis of the data suggests that only six percent of the total sero-discordant couples are currently using condoms. The most common reason for not using condoms even after one partner has tested HIV positive is apprehension related to mistrust and lack of confidence.

It is well documented that women are at a greater risk for HIV not only for biological but also for socio-cultural and behavioural reasons. The literature highlights that women in intimate partner relationships are at risk for HIV due to several factors including but not limited to gender inequities, cultural norms and limited economic and social autonomy which result in their lack of control over making sexual decisions. Women's lack of control over their sexual lives is exacerbated by domestic violence that includes coercive sex. There is growing evidence of the high prevalence of intimate partner violence including sexual violence and its impact on HIV infection in women. Research has shown that elevated rates of sexual risk behaviours among men are linked to intimate partner violence (e.g., extramarital sex, multiple sex partners, non-use or inconsistent condom use, and forced unprotected sex).

The review shows that in the case of nearly one-fifth of the discordant couples, the women are HIV positive. This finding contradicts the long-standing assumption that the primary direction of HIV transmission is from male to female, i.e. first men become infected and then they infect their wives/intimate sexual partners. The specific circumstances which expose women to HIV risk, particularly in female sero-discordant couples, need further investigation. Women could be infected by infected syringes and through blood transfusion. However, little is known about the circumstances under which women form relationships with men other than their husbands and the manner by which these relationships increase their HIV risk. Research is also needed to understand the complex social and sexual lives of women who live in urban areas as well as those who are left behind in the villages because their husbands migrate to cities. Understanding these dynamics could help in designing new approaches for preventing HIV infections in women and men.

Conclusion: Till date, HIV prevention interventions, including those for high-risk population groups who have steady sexual partners, have been primarily aimed at individuals who have been encouraged to use condoms. Specific interventions should be designed to address situations in which one partner is infected in order to protect the uninfected partner who is at high risk of infection. Though the guidelines for targeted interventions under NACP-3 emphasise the need for targeting regular sexual partners of high-risk groups particularly IDUs, migrant workers and truckers, evidence on best practices is scarce. The recommendations of this report draw attention to the need for operations research to provide the evidence for designing appropriate interventions for preventing HIV infection in intimate partner relationships.

The following strategies are recommended for immediate and long term programmatic agenda for prevention of HIV in intimate partner relationships:

Strengthen linkages between and integrate services of the National AIDS Control Programme (NACO) and the Reproductive and Child Health Programme (RCH).

Provide services for intimate sexual partners at HIV testing and care facilities.

Identify, adapt and upscale interventions to prevent HIV transmission in regular sexual partners of MSM, IDU and clients of sex workers.

Mainstream gender and HIV concerns across various different government ministries (Ministries of Education, Home Affairs, AYUSH, Women and Child Development).

In conclusion, addressing HIV prevention in intimate partner relationships needs multi-sectoral and multi-level engagement by government, civil society organisations and international agencies in India.

Presenting Author	Singh D
Title of the Presentation	Buddies and daddies: how social capital mediates migrants' HIV risk at destination

Singh D, O'Neil J, Blanchard J, Mignone J, Moses S.

Presented at the XVII International AIDS Conference, Vienna, Austria, July 18-23, 2010

Introduction: Social capita framework was employed to try to understand how migration affects migrants' HIV risk at destination place.

Methods: The study was undertaken among Rajasthani migrants of age 18 and above in Mumbai and Ahmedabad to collect data from 1598 migrants through survey method and from 93 migrants through qualitative methods from January to June 2007.

Results: The context specific organization of social capital in the two study sites gave rise to what could be called a 'buddy culture' in Ahmedabad and a 'daddy culture' in Mumbai. Most migrants in Ahmedabad were young and unmarried. The loss of family and community ties due to migration was compensated by forming friend-based networks; thus engendering a buddy culture. On the other hand in Mumbai, migration happened on the line of family, kinship and caste. In many cases, a son or younger brother joined his father or elder brother. In Mumbai, people lived with their relatives, father or brother. There were always some known senior migrants around either as a roommate or as an employer/contractor.

Social capital, in most domain and component forms, was associated with HIV risk measures but owing to the difference in content and quality of social capital among migrants in Mumbai and Ahmedabad, the relationship was complex. High levels of overall social capital, bridging social capital and components of bridging social capital were protective of HIV risk in both the cities while high level of linking social capital was associated with lower HIV risk in Mumbai and higher HIV risk in Ahmedabad.

Conclusion: This study, for the first time in epidemiological research, was able to explore the mediating effect of social capital on migrants' differential HIV risk at the domain levels. Further research in different epidemiologic settings is required to fully understand the migration and HIV dynamics.

Presenting Author	Halli S
Title of the Presentation	HIV risk associated with mobile female sex workers in the context of <i>jatras</i> (festivals) in Karnataka, India

Halli S, Buzdugan R, Blanchard J, Jain A, Verma R, Moses S, Saggurti N

Presented at XVIII Biennial Meeting of the International Society for STD Research (ISSTD), London, United Kingdom, June 28 – July 1, 2009

Objective: The state of Karnataka in South India has a number of *jatras* (festivals) in which people gather for a short duration of time at specific locations, usually prompted by religious observances. *Jatras* also represent venues for female sex workers (FSWs) to meet potential clients in an environment of anonymity. The present study, supported by the India AIDS Initiative of the Bill & Melinda Gates Foundation, examines the predictors of *jatra* participation by FSWs and the associated HIV risk.

Methods: Data from a quantitative survey conducted among 1,499 mobile FSWs in northern Karnataka were analysed using multinomial logit regression predicting sex work at *jatras*, and logistic regression predicting condom use at last sex with a commercial client. Qualitative data consisting of interviews with FSWs and their clients were also examined.

Results: Overall, 31% of mobile FSWs reported attending *jatras* in the previous year, and in some districts this was as high as 49%. Significant predictors of practising sex work at *jatras* were the district of origin, age, religion, and duration and type of sex work. FSWs who practised sex work at *jatras* reported lower condom use at last sex with commercial partners at their places of origin (odds ratio=1.9), even after controlling for other socio-demographic and sex work characteristics. Only 13% of FSWs used condoms consistently at *jatras*. Qualitative data suggests that this is a result of the lack of availability and accessibility to condoms, the improvised environment for sex work, lack of privacy, high alcohol consumption, clients' unwillingness to use condoms, and FSWs' perception that the clients are less risky.

Conclusions: FSWs who attend *jatras* engage in riskier sexual behaviour at their places of origin compared to non-*jatra*-attendees. In addition, most FSWs do not use condoms at *jatras*. HIV prevention programs among FSWs should offer enhanced outreach activities and services at *jatras*.

Presenting Author	Gurav K
Title of the Presentation	Vulnerabilities associated with migration of female sex workers (FSWs) in brothel settings in India

Gurav K, Takkannavar H, Naduvinamani M, Satyanarayana M, Lorway R, Blanchard J.

Presented at the XVII International AIDS Conference, Vienna, Austria, July 18-23, 2010

Background: Migration of “devadasi” FSWs from Northern Karnataka to the neighbouring state of Maharashtra is a historical phenomenon. *Migration exposes FSWs to multiple vulnerable contexts. The objective of “Payana” project was to assess HIV risk and vulnerability associated with FSW migration through periodic quantitative interviews with migrant (654) and non-migrants (919) FSWs and qualitative in-depth interviews with FSWs family members and Brothel Madams (BMs).*

Method: For the present paper, quantitative interviews conducted with 517 Migrant FSWs, and qualitative in-depth interviews conducted among 12 BMs are analysed.

Results: Three main contexts of vulnerabilities are:

[1] Mediation of migration: The migration mediated by the BMs involve lending money to the families of FSWs, such FSWs (10%) are more likely to be under the control of BMs and less likely to be reached by the programme.

[2] Police raids and Pregnancy: The police raids influence young /minor FSWs to get pregnant and have a child because, “Having a child” is used as evidence by BM to convince the police that FSW is major and thus protect herself from getting arrested and paying huge amount of fine.

[3] Relationships with Regular Partners (RPs): 25 % of FSW have RPs, 87% of them reported that they did not use condoms. It appears that “No condoms with RPs” is norms which define their relationship. Besides this, RPs mediate the movement of FSWs from: (A) one brothel to another for money and (B) brothel to his residence and make FSW work independent of BM. Thus, RPs role in FSWs profession and his position in relationship make FSWs vulnerable for HIV.

Conclusion: To a large extent, FSWs Vulnerability to HIV is shaped by the diverse contexts in sex work environment. Understanding those contexts and addressing them through innovative intervention strategies could bring better results than targeted interventions.

Presenting Author	Isac S
Title of the Presentation	Distribution of rural sex work in India: implications for HIV prevention strategies

Isac S, Ramesh BM, Moses S, Blanchard J, Gurnani V, Washington R.

Presented at the VIII International Conference on AIDS in Asia and the Pacific (ICAAP), Colombo, Sri Lanka, August 19-23, 2007

Background: We explored the size and distribution of female sex workers (FSWs) in rural Karnataka State in South India, in preparation to implementing an HIV prevention program.

Methods: Data on number of FSWs and village characteristics were collected through key informant interviews in 7,713 villages with over 500 population in 9 districts.

Results: The estimated number of FSWs was 29,212, ranging from 900 to 6892 per district. The average number of FSWs per 1,000 adult females was 8.5, ranging from 3.3 to 19 per district. 57% of villages had at least one FSW. Multivariate analysis examined village-level characteristics in relation to FSW population size: village size, scheduled caste population size, distance to the nearest town or highway, number of large public events, presence of a factory/construction site nearby, presence of a weekly market, and migration. Characteristics that made the greatest contribution were presence of a weekly market, number of large public events, and a factory/construction site nearby.

Conclusions: These data indicate that sex work is widespread in rural areas of Karnataka, and prevention programs and services need to be extended to those areas. Clustering of FSWs in certain types of villages suggest that outreach strategies should be targeted to improve efficiency.

Presenting Author	Gurav K
Title of the Presentation	Is condom use practice among female sex workers dependent on the type of the sexual partnership?

Gurav K, Lowndes CM, Ramesh BM, Jayachandran AA, Mahapatra B, Blanchard J, Moses S, Washington R, Alary M.

Presented at the VIII International Conference on AIDS in Asia and the Pacific (ICAAP), Colombo, Sri Lanka, August 19-23, 2007

Objective: To examine condom use patterns and to explore reasons for condom use and non-use in the context of different sexual partnerships among female sex workers (FSWs).

Methods: A behavioural survey was carried out among FSWs in Bellary, Karnataka, India. Condom behaviour of 198 respondents who provided complete interviews is studied in the context of four types of sexual partnerships: **A.** non-commercial live-in partners (husband/ cohabiting partners); **B.** non-commercial non-co-habiting partners (lovers); **C.** repeat clients **D.** new clients.

Results: Only 13% and 52% of the women reported always using condoms with type **A** and **B** partners, respectively, whereas the corresponding proportions were around 80% for both type **C** and **D partners**. 52% and 30% of women reported never using condoms with type **A** and **B** partners, respectively, whereas this proportion was only 0.8% and 3.7% with type **C** and **D** partners, respectively. Protection from HIV/STIs is a more frequent motivator for using condoms in commercial (C &D) than in non-commercial relationships (A&B). Reluctance of the partners to use condoms increases with the decreasing proximity of the relationship (A to D).

Conclusion: Intervention efforts need to focus beyond sex worker-client relationships and need to address multiple facets of sexual partnerships

Presenting Author	Bhattacharjee P
Title of the Presentation	Violence against female sex workers in Karnataka state, south India: impact on health, and reductions in violence following an intervention program

Beattie TSH, Bhattacharjee P, Ramesh BM, Gurnani V, Anthony J, Isac S, Mohan HL, Ramakrishnan A, Wheeler T, Bradley J, Blanchard JF, Moses S

Published in BMC Public Health 2010; 10:476

Background: Violence against female sex workers (FSWs) can impede HIV prevention efforts and contravenes their human rights. We developed a multi-layered violence intervention targeting policy makers, secondary stakeholders (police, lawyers, media), and primary stakeholders (FSWs), as part of wider HIV prevention programming involving >60,000 FSWs in Karnataka state. This study examined if violence against FSWs is associated with reduced condom use and increased STI/HIV risk, and if addressing violence against FSWs within a large-scale HIV prevention program can reduce levels of violence against them.

Methods: FSWs were randomly selected to participate in polling booth surveys (PBS 2006-2008; short behavioural questionnaires administered anonymously) and integrated behavioural-biological assessments (IBBAs 2005-2009; administered face-to-face).

Results: 3,852 FSWs participated in the IBBAs and 7,638 FSWs participated in the PBS. Overall, 11.0% of FSWs in the IBBAs and 26.4% of FSWs in the PBS reported being beaten or raped in the past year. FSWs who reported violence in the past year were significantly less likely to report condom use with clients (zero unprotected sex acts in previous month, 55.4% vs. 75.5%, adjusted odds ratio (AOR) 0.4, 95% confidence interval (CI) 0.3 to

0.5, $p < 0.001$); to have accessed the HIV intervention program (ever contacted by peer educator, 84.9% vs. 89.6%, AOR 0.7, 95% CI 0.4 to 1.0, $p = 0.04$); or to have ever visited the project sexual health clinic (59.0% vs. 68.1%, AOR 0.7, 95% CI 0.6 to 1.0, $p = 0.02$); and were significantly more likely to be infected with gonorrhea (5.0% vs. 2.6%, AOR 1.9, 95% CI 1.1 to 3.3, $p = 0.02$). By the follow-up surveys, significant reductions were seen in the proportions of FSWs reporting violence compared with baseline (IBBA 13.0% vs. 9.0%, AOR 0.7, 95% CI 0.5 to 0.9 $p = 0.01$; PBS 27.3% vs. 18.9%, crude OR 0.5, 95% CI 0.4 to 0.5, $p < 0.001$).

Conclusions: This program demonstrates that a structural approach to addressing violence can be effectively delivered at scale. Addressing violence against FSWs is important for the success of HIV prevention programs, and for protecting their basic human rights.

Presenting Author	Prakash KH
Title of the Presentation	Sex work, Syphilis, and Seeking Treatment: An Opportunity for Intervention in HIV Prevention Programming in Karnataka, South India.

Mishra S, Moses S, Hanumaiah PK, Washington R, Alary M, Ramesh BM, Isac S, Blanchard JF.

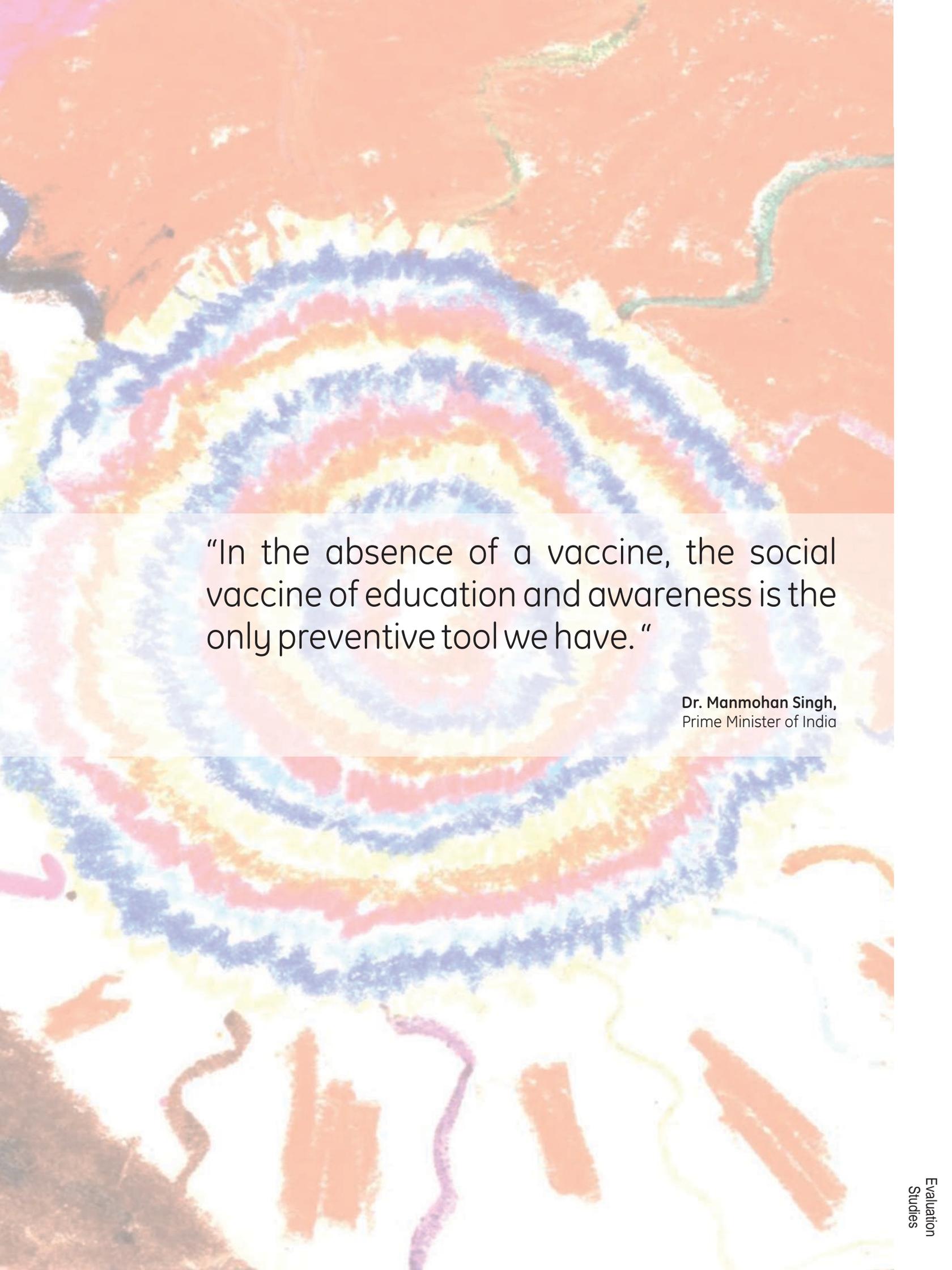
Published in Sex Transm Dis 2009; 36:157-64

Objectives: To measure the determinants of syphilis among female sex workers (FSWs) in the state of Karnataka, South India.

Methods: During 2004-2006, cross-sectional surveys were administered to 2312 FSWs across 5 districts in the state, in the context of a large-scale HIV preventive intervention program. Demographic and behavioural information, and serum (for syphilis, HSV-2 and HIV) and urine specimens (for Neisseria gonorrhoea and Chlamydia trachomatis) were obtained.

Results: The prevalences of lifetime (TPHA positive) and active (RPR and TPHA positive) syphilis were 25.3% and 9.6%, respectively. There was considerable variation in the prevalence between districts, ranging from 10.9% to 37.4% lifetime, and 3.4% to 24.9% active infection. Factors associated with lifetime syphilis were older age, longer duration of sex work, illiteracy, client volume, practising sex work in >1 city, and sex work typology (public solicitation followed by brothel or lodge-based sex). The same typology, client volume, illiteracy, and having been widowed, divorced or deserted, were predictive of active infection. Of the 976 women who had symptoms of an STI, 78.8% had sought medical treatment, behaviour that was protective for both outcomes. HIV infection was strongly associated with lifetime (OR 2.0; 95% CI: 1.6-2.6) and active syphilis (OR 2.1; 95% CI: 1.5-2.9).

Conclusions: Despite reasonable treatment-seeking behaviour, the high prevalence of syphilis has necessitated enhanced outreach efforts for FSWs and acceleration of the implementation of syphilis screening. Mobilizing resources to enhance syphilis control will not only reduce the burden of syphilis morbidity, but should impact in reducing HIV transmission.



“In the absence of a vaccine, the social vaccine of education and awareness is the only preventive tool we have.”

Dr. Manmohan Singh,
Prime Minister of India

Presenting Author	Thongamba G
Title of the Presentation	Prevalence of HIV and hepatitis (B & C) among Injecting Drug Users (IDUs) in two HIV high prevalent states of North East, India: Findings from two rounds of surveys.

Thongamba G, Lenka S, Goswami P, Gautam A, Ramakrishnan, Adhikary R, Kumar MG, Brogen SA, Ngully P, Mahanta J.

Background: There is increasing evidence that suggest a higher prevalence of Hepatitis C (rather than HIV) among IDUs. Though both hepatitis C virus (HCV) and HIV virus are both blood borne and can spread through sharing of needle and syringes; HCV transmission through sexual route is hardly established. It is acknowledged and accepted that sharing of needles and syringes has been the major association with HCV and HIV transmission among IDUs. The significant problem of HIV and Hepatitis C among IDUs is increasingly recognized worldwide.

Avahan program initiated by Bill & Melinda Gates Foundation was implemented in 2004 with aim of slowing down the HIV transmission rate among the IDUs in Manipur and Nagaland. **A core package of services for IDU populations which mainly focuses on NSEP (Needle syringe exchange program) and condom promotion services were provided to the IDUs by this initiative.** Integrated Behavioural and Biological Assessment (IBBA) was conducted in 2006 (R1) and 2009 (R2) to measure the change in the injecting risk behaviours and HIV prevalence among IDUs in two districts (Churachandpur and Bishnupur) in Manipur and two districts (Phek and Wokha) in Nagaland. IDUs aged 18 years or older who had injected at least once in past six months were the eligible respondents. Structured interviews were conducted to collect information on drug use and sexual behaviours of the respondents. Biological samples were also collected from them to estimate the prevalence of HIV, HBV and HCV.

The current paper presents the findings among IDUs from two rounds of repeated impact surveys conducted in two states in North East, India. This paper will compare the prevalence estimate of HIV and Hepatitis (B & C) among IDUs in the four districts of the two states.

Method: Respondent **Driven Sampling (RDS)**, a chain referral probability sampling strategy was adopted in both the rounds of survey. **RDS sites in each district were established for conducting interviews and collection of biological samples from the respondents.** 400 IDUs were recruited in each district. A total of 3200 IDUs (R1-1600, R2-1600) were interviewed who had attended the age of 18 years and have injected at least one in six months in four districts in the states of Manipur (Bhisnupur and Churachandpur), Nagaland (Phek and Wokha). Structured interviews were conducted to collect information on drug use and sexual behaviours. Biological samples (Dried Blood Spot) were also collected from the respondents to estimate the prevalence of HIV and hepatitis B and C.

Result: The findings from the two rounds of IBBA suggest that there is no significant increase in HIV prevalence in the districts of Nagaland (Wokha: R1 = 1.8%, R2 = 2.1%) (Phek: R1 = 1.1%, R2 = 1.0%) where as Manipur shows significant decrease of HIV prevalence in Bhisnupur (R1 = 23.1%, R2 = 16.2%, $p < 0.01$) while Churachandpur showed a significant increase (R1 = 32.2%, R2 = 39.9%, $p < 0.01$).

There is also no significant increase in Hepatitis C prevalence in the districts of Nagaland (Wokha: R1 = 16.7%, R2 = 20.8%) (Phek: R1 = 5.4%, R2 = 8.7%) where as Manipur shows significant decrease of Hepatitis C prevalence in Bhisnupur (R1 = 55.9%, R2 = 45.7%, $p < 0.01$) and a significant increase in Churachandpur (R1 = 77.6%, R2 = 92.2%, $p < 0.01$)

There is no significant change in Hepatitis B prevalence in the districts of Nagaland (Wokha: R1 = 6.9%, R2 = 9%) (Phek: R1 = 4.8%, R2 = 7.5%) where as Manipur shows significant increase of Hepatitis B prevalence (Bhisnupur: R1 = 6.3%, R2 = 9.7%, $p < 0.01$) (Churachandpur: R1 = 5.8%, R2 = 11.6, $p < 0.01$). However, it is noted that prevalence of Hepatitis B has remained low (below 12%) in all the districts.

Conclusion: The results suggest dissimilar prevalence and spread of HIV and Hepatitis C in these two states. The results also suggested that higher proportions of IDUs are currently living with Hepatitis C infection in both the states. Access to treatment will be critical for those who are infected with Hepatitis C or co-infected with HIV/hepatitis, since there is no clear treatment strategy or policy adopted for Hepatitis C or co-infection of HIV/hepatitis C among IDUs.

Presenting Author	Ramesh BM
Title of the Presentation	Determinants of HIV prevalence among female sex workers in four south Indian states: analysis of cross-sectional surveys in twenty-three districts.

Ramesh BM; Moses S; Washington R; Shajy I; Bidhubhushan M; Mahagaonkar SB; Rajatashuvra A; Brahmam GNV; Paranjape RS; Thilakavathi S; James FB

Published in AIDS (London, England) 2008;22 Suppl 5():S35-44

Objective: In four states in southern India we explored the determinants of HIV prevalence among female sex workers (FSW), as well as factors associated with district-level variations in HIV prevalence among FSW.

Methods: Data from cross-sectional surveys in 23 districts were analysed, with HIV prevalence as the outcome variable, and sociodemographic and sex work characteristics as predictor variables. Multilevel logistic regression was applied to identify factors that could explain variations in HIV prevalence among districts.

Results: HIV prevalence among the 10 096 FSW surveyed was 14.5% (95% confidence interval 14.0-15.4), with a large inter-district variation, ranging from 2% to 38%. Current marital status and the usual place of solicitation emerged as important factors that determine individual probability of being HIV positive, as well as the HIV prevalence within districts. In multivariate analysis, compared with home-based FSW, the odds of being HIV positive was greater for brothel-based FSW [adjusted odds ratio (AOR) 2.17, $P < 0.001$] and for public place-based FSW (AOR 1.32, $P = 0.005$). Unmarried FSW and those who were widowed/divorced/separated, or from the devadasi tradition, had higher odds of being HIV positive (AOR 1.79, $P < 0.001$ and 1.98, $P < 0.001$, respectively), than those currently married. The estimated district level variance in HIV prevalence was lowest (0.152) for brothel-based unmarried FSW, followed by brothel-based widowed/divorced/separated or devadasi FSW (0.192).

Conclusion: Heterogeneity in the organization and structure of sex work is an important determinant of variations in HIV prevalence among FSW across districts in India, much more so than the districts themselves. This understanding should help to improve the design of HIV preventive interventions.

Presenting Author	Ilanchezhian T
Title of the Presentation	A Community driven Inter-personal communication and mid-media campaign targeting the Men having Sex with Men (MSM) in Tamil Nadu: An Evaluation of the Effectiveness of the campaign

Bimal C, Ilanchezhian T, Ebenezer LC, Edwin SA

Back ground: Behavioural change communication through Inter-personal communication (IPC) combined with the powerful and invasive mid-media campaign such as street play, folk songs and exhibition of IEC are considered as promising tools for health promotion especially in HIV/AIDS prevention and control. These strategies are expected to create positive and desired behavioural changes among the community. AIDS Prevention and Control Project(APAC) in collaboration with Tamil Nadu State AIDS Control Society(TNSACS) designed the District Level Communication Campaign (DLCC) for the MSM population, adopted a community driven model in which the MSM themselves played an important role in designing and implementation of the campaign. The campaign primarily used Inter-personal communication through the Peer Educators. Interpersonal communication training was given to the selected MSM peer educators who were named as 'THOZHAS' which means "FRIENDS". Around 2000 "Thozhas" were selected in the ratio of 1 "Thozha" per 20 MSMs. These "Thozhas" took the message to both hidden and known MSMs in the community. Apart from IPC, a judicious use of mid media like street play and folk songs, mobile exhibitions and display of IEC materials which include mobile IEC van, display of panels and posters specifically designed for the community, were also included in the campaign. The specific objectives of the campaign were to increase knowledge level, bring down the myths and misconception, increase the condom usage and motivate the MSM community to access services from Master Health Check-up (MHC) and ICTC services. In order to understand the effectiveness of this initiative, an evaluation study was conceptualized

and carried out in all the 6 Intensive Intervention Districts of APAC and Puducherry State where the campaign was rolled out.

Methods: A pre and post-evaluation design was used to evaluate the effectiveness of the DLCC in achieving the intended objectives. The pre-evaluation was conducted among 769 MSM including kothis and double duckers. During the post-evaluation 769 MSM were contacted and among them 463 MSMs who were exposed to the DLCC were included for the post intervention study. An interview schedule was used in both pre and post evaluation and the interviews were conducted at the hotspots. The sample size in each district was decided based on the number of MSMs in each district and at least 5 percent (Mapping data) of the MSM population were ensured for the study. Apart from this, in-depth interviews were conducted among the '*Thozhas*' from 19 NGOs. A total number of 38 in-depth interviews were conducted.

Results: Around 50 percent of the MSMs were in the age group of 25-30 years; the average age was 29.63 years. The literacy level was high (95%) among them. More than one-fourth (27%) were ever married to a woman and among them 65 percent were currently married and living with spouse.

Overall reach of the campaign among MSM was very significant and a district wise analysis indicated that the reach was high in southern districts like Kanyakumari (70%), Tirunelveli (65%) and Tuticorin (63%). Among the various mediums used during the campaign, three fourth (75%) of the MSM had received messages through Inter-Personnel Communication (IPC) followed by street theatre (71%) while 61 percent reported that they received messages through posters and 60 percent through mobile exhibitions. The printed message on playing cards which is part of the campaign had reached around 57 percent of the respondents. The study revealed that the message

recall by the respondents was high on topics such as HIV testing (96%), condom use (93%), STI treatment (86%), health check-up (85%) and use of lubricants (82%). The study also indicated an increase in the percentage of MSM who had undergone HIV testing from 62 percent during pre evaluation to 88 percent during post evaluation. Around 14 percent accessed STI treatment from the Nakshatra Clinic which is a PPP initiative as the result of the campaign. An increase in the comprehensive knowledge of HIV prevention among MSM (from 31% to 49 %) was also reported. Around 700 MSMs were newly identified and enrolled in the programmes. In addition, 2437 accessed ICTC services and 2137 accessed MHC services due to this campaign.

However, MSM who used lubricants during anal sex has remained the same (83%) both during pre and post evaluation. It was also reported that the average number of MSM who had practiced anal sex with commercial partners have come down from 16.74 to 9.37 percent during post evaluation. The study results also recorded the positive attitude and the sense of urgency among the “Thozhas” to reach out to the hidden MSM.

Conclusion: This study produces evidences for the efficacy of IPC combined with mid media campaign among MSM. The novel approach of involving the community as ambassadors of the campaign has resulted in both capacity building of the “THOZHAS” and also in reaching out the hidden MSM population. It has resulted in better outcome in terms of access to services and increased knowledge level. However, sustained efforts and interventions at all levels are required in order to maintain the status.

Presenting Author	Gurung A
Title of the Presentation	A retrospective analysis of the performance of different service delivery models for managing sexually transmitted infections among high risk population in India

Gurung A, Narayanan P, Mugundu P, Tiwari A, Prabhakar P

Background: Sexually transmitted infection (STI) services is an important component of the HIV prevention services provided by *Avahan*, the India AIDS Initiative of the Bill & Melinda Gates Foundation to female sex workers (FSW) and men having sex with men (MSM) in the six high prevalence states of India. The objective of this study is to assess the performance of different types of service delivery models used by the *Avahan* program from 2005 to 2008 - static clinics, outreach clinics (health camps and mobile clinics) and preferred provider (PP) clinics.

Methods: This retrospective study has been done using the data from individual tracking system developed in the *Avahan* clinics and the monthly reporting data available in the computer management information systems (CMIS) from 2005-2008.

Results. A total of 2,94,569 HRGs made 13,65,554 visits from 2005 to 2008. The numbers of service delivery sites were scaled up from 232 in 2005 to 1478 clinics in 2008. The proportion of HRGs who accessed the types of service delivery model varied from 74.3% in static clinics, 20.1% in preferred provider and 0.97% in outreach clinics in 2005 to 62.3% in static clinics, 11.9% in preferred providers and 19.83% in outreach clinics in 2008.

There was a significant increase in the uptake in services at all the service delivery models from the year 2005 to 2008 ($P < .0001$). An increase was seen in the STI case loads ($P < .0001$) which include initial and follow-up visits for STI symptoms and regular STI check-ups. Regular STI check ups ($P < .0001$) also increased while the number of HRGs given presumptive treatment (PT) for gonorrhoea and chlamydia showed a significant increase in the static clinic and the outreach clinic. ($P < .0001$) (Table 1)

There were an increasing proportion of younger HRGs (< 25 years) accessing the *Avahan* clinics from 2005 to 2008 ($P < .0001$) However, younger HRGs accessed outreach clinics more as compared to the static clinics and the PP clinics ($P < .001$). There was a changing

typology of female sex workers (home-based & street- based) accessing the various service delivery models (Table 2)

Conclusions: There is a dynamic process among the HRGs accessing the various STI service delivery models. Avahan clinics have modified and changed the service delivery models to increase access and coverage to the HRG in the targeted intervention sites. As the project matured, there has been a significant increase in the uptake of clinic services for STI consultations, regular medical check ups. Clinical services are increasingly being accessed by younger HRGs.. The appropriate type of the STI service model for special categories of high risk population such as young, home based female sex workers and MSM should be carefully assessed, planned and modified if required to provide adequate coverage and high quality STI services. The National AIDS Control Program (NACP III) targeted intervention guidelines recommend different STI service delivery models based on enumerated HRGs. However, further cost efficiency/effectiveness studies need to be done to arrive at models or combination of models which are appropriate for local conditions and typology of population being served.

Presenting Author	Rajasekharan S
Title of the Presentation	Effectiveness of Management of HIV-TB Patients under Programme Conditions in India

Rajasekaran S, Jeyaseelan L, Chandrasekar C, Madhavan K, Mahilmaran A, Thara F.

Published in JK Science, 2008, 10: 70-73

HIV patients, on antiretroviral therapy (ART), with co-existing tuberculosis patients were assessed for clinical and immunological progress at GHTM ART centre for effectiveness of management programme. Six hundred and twenty two HIV-TB patients are placed under both Anti-TB Treatment (DOTS) and ART. While 337 patients are continuing their ATT, details of the remaining 283 patients are provided. 214 patients (76%) completed their treatment successfully. 29 patients (10%) expired before completing treatment for TB and 40 patients (14%) were treatment defaulters. Immunologically CD4 cells registered significant increase from 101(mean) to 306 (mean) in 202 treatment-completed patients ($p=.001$). Linking HIV patients on ART to their nearest DOTS centres for treating tuberculosis is feasible. High Mortality, even before completing the prescribed course of ATT is attributable to low immunity and complicating opportunistic infections. Referral and linkage services shall be improved and strengthened for enhanced treatment adherence.

Presenting Author	Mangalore NR
Title of the Presentation	Mainstreaming the prevention of parent-to-child transmission (PPTCT) program with the national rural health mission (NRHM): experiences from Southern India

Mangalore NR, Jannu RR, Washington R, Anthony, Chennaiah L.

Presented at XVII International AIDS Conference, Vienna, Austria, July 18-23, 2010

Issues: Approximately 1.2 million pregnancies occur annually in Karnataka state, south India, and the estimated HIV prevalence in pregnancy from sentinel surveillance was 0.86% in 2008. Since its inception, the PPTCT program in Karnataka has worked as a vertical program implemented by Karnataka State AIDS Prevention Society (KSAPS). PPTCT activities were therefore not seen as part of the existing health system, and general health resources were not tapped. This resulted in gaps in HIV testing and follow-up for pregnant women. In March 2008, a plan was drafted to integrate the PPTCT program with the NRHM.

Description: An inter-departmental government directive was issued on PPTCT-NRHM integration in 2008. Auxiliary Nurse Midwives (ANMs; grass-root level workers under NRHM) were given responsibilities to implement the PPTCT Program. Reporting was built into the regular health department management information system. Government District AIDS Prevention and Control Unit Officers, and Reproductive and Child Health Officers, monitored the implementation of PPTCT activities at district level. Line-listings of HIV positive pregnant women were made available to all health care providers on a “shared confidentiality” basis. Uptake of testing improved from 242,021 pregnant women tested in 2007 to 750,458 in 2009. Mother-baby pair coverage increased from 40% (2007) to 61% (2009). Approximately 9,500 ANMs and 2000 primary care medical officers form the program backbone.

Lessons learned: Integration was accomplished with the commitment and involvement of stakeholders from the highest levels of government to grass-root level workers, with clear-cut roles and responsibilities. Wastage and duplication of resources was avoided, which helped bring the program to scale.

Next steps: Two years' experience has shown that mainstreaming can achieve the scale-up of PPTCT services, by utilizing the strengths of the existing health systems to cater to the needs of pregnant women. This model has now been recommended for national replication.

Presenting Author	Shetty B
Title of the Presentation	Improving access to STI care among female sex workers (FSWs) by strengthening preferred providers network in Bangalore City, South India

Shetti B, Moses S, Parinita B, Kumar NS, J Prakash, Prakash KH.

Presented at XVII International AIDS Conference, Vienna, Austria, July 18-23, 2010

Issues: Making STI and other health services more accessible to female sex workers (FSWs) in a large city like Bangalore has been a challenge, because of the dispersed nature of the FSW population. We therefore sought to improve health care seeking behaviour among FSWs.

Description: The Karnataka Health Promotion Trust (KHPT) has been implementing an HIV prevention program in Bangalore since 2005, supported by the India AIDS Initiative of the Bill & Melinda Gates Foundation. The project has registered 18,000 FSWs, and about 10,000 are in regular (monthly) contact with the program. In the first three years of the project, STI services were provided through eight drop-in-centre (DIC) clinics (program-linked clinics), and 20 referral doctors. Discussions with FSWs indicated that distance to and inconvenient timing of the clinics were major barriers to accessing services. A strategy was therefore developed to expand the network of referral doctors. Referral doctor networks were established at sites based on recommendations made by FSWs, both in government and private clinics. A total of 70 referral doctors were identified and trained to provide quality STI services. Program-linked clinics in DICs were reduced from eight to two, and were offered in the four DICs on a rotational basis, on specific days of the week. This model has resulted in a significant increase in quarterly clinic visits, from 40% to 52% of all FSWs in regular program contact, in every quarter from April 2008 to December 2009. There has also been a decrease in clinic program costs.

Lessons learned: Establishing a network of referral clinics to complement DIC-based clinics in the context of a large-city HIV prevention program, has made STI care more accessible, and health care services more sustainable.

Next steps: Service uptake will continue to be monitored, and referral networks further expanded to facilitate increased access to clinical services.

Presenting Author	Krishnamurthy J
Title of the Presentation	Assessment of attitude and practice of STI care providers toward sex workers in Karnataka State,India

Krishnamurthy J, Washington R, Moses S, Murugan S, Ramesh BM, Prakash S, Balu PS, Badiger S, Mendonca V, Bhavimani S.

Presented at VIII International Conference on AIDS in Asia and the Pacific (ICAAP), Colombo, Sri Lanka, August 19-23, 2007

Objectives: We assessed the attitudes and practices of STI care providers towards female sex workers (FSWs), and the perceptions of FSWs towards STI services.

Methodology: This study was undertaken in the context of the India AIDS Initiative (Avahan) of the Bill & Melinda Gates Foundation. 256 clinic exit interviews of sex workers were conducted and informal discussions were held with 102 STI care providers (physicians) across several districts in Karnataka.

Results: 92% of FSWs agreed that clinic location was appropriate and 62% had waited for less than 30 minutes before seeing a physician. 53% of women agreed with the importance of a speculum examination, but only 51% was offered speculum examination. 57% and 83% of women reported that the physician enquired about partner symptoms and condom use respectively. 84% of women were assured of their confidentiality status. 24% of physicians believed that sex work should be banned to control HIV. 76% agreed that sex workers should be involved in planning of services.

Conclusions: Quality of care appears to be acceptable overall, but it is important to improve attitudes of providers towards sex work, and improve practices such as speculum examination and partner referral that can enhance quality of care.

Presenting Author	Sushena R
Title of the Presentation	Declines in risk behaviour and sexually transmitted infection prevalence following a community-led HIV preventive intervention among female sex workers in Mysore, India

Sushena R, Tara B, Rahman SHU, Koppal TV, Mysore SV, Fathima Mary P, Raghavendra HR, Pasha A, Ramaiah M, Lakshmi M, Isac S, Ramesh BM, Reynold W, Mahagaonkar SB, Glynn JR, Blanchard JF, Stephen M

Published in AIDS (London, England) 2008;22 Suppl 5():S91-100

Objective: To investigate the impact on sexual behaviour and sexually transmitted infections (STI) of a comprehensive community-led intervention programme for reducing sexual risk among female sex workers (FSW) in Mysore, India. The key programme components were: community mobilization and peer-mediated outreach; increasing access to and utilization of sexual health services; and enhancing the enabling environment to support programme activities.

Methods: Two cross-sectional surveys among random samples of FSW were conducted 30 months apart, in 2004 and 2006.

Results: Of over 1000 women who sell sex in Mysore city, 429 participated in the survey at baseline and 425 at follow-up. The median age was 30 years, median duration in sex work 4 years, and the majority were street based (88%). Striking increases in condom use were seen between baseline and follow-up surveys: condom use at last sex with occasional clients was 65% versus 90%, $P < 0.001$; with repeat clients 53% versus 66%, $P < 0.001$; and with regular partners 7% versus 30%, $P < 0.001$. STI prevalence declined from baseline to follow-up: syphilis 25% versus 12%, $P < 0.001$; trichomonas infection

33% versus 14%, $P < 0.001$; chlamydial infection 11% versus 5%, $P = 0.001$; gonorrhoea 5% versus 2%, $P = 0.03$. HIV prevalence remained stable (26% versus 24%), and detuned assay testing suggested a decline in recent HIV infections.

Conclusion: This comprehensive HIV preventive intervention empowering FSW has resulted in striking increases in reported condom use and a concomitant reduction in the prevalence of curable STI. This model should be replicated in similar urban settings across India.

Presenting Author	Pickles M
Title of the Presentation	Exploring how different trends in condom use match the HIV and STI epidemics among high-risk groups in India using dynamic modelling

Pickles M, Foss AM, Vickerman PMC, Alary BM

Presented at 2nd Epidemics conference, 2 – 4 December 2009, Athens, Greece.

Objectives: Using mathematical modelling, this study aims to explore whether self-reported increases in condom use by female sex workers (FSW) in two districts of southern India are consistent with the HIV/STI prevalence data collected, and to compare these with a scenario in which there has been no increase in the level of condom use since the beginning of the Avahan India HIV/AIDS Initiative.

Methods: A large-scale deterministic compartmental model of HIV/STI transmission, incorporating heterogeneity in sexual behaviour of FSWs and clients, was developed to assess the impact of the Avahan Initiative on HIV in India. The model was parameterised and fitted using behavioural survey data and HIV/STI prevalence data from two districts in Karnataka – Mysore and Belgaum. Two scenarios to model condom use among FSW were employed: (1) condom use increased according to survey data from FSW; (2) condom use did not increase after the Avahan initiative. The number of fits, where HIV, HSV-2 and syphilis prevalences among FSWs and their clients in 2004 simultaneously lie within the confidence intervals of the data, was examined from each scenario to explore which of these scenarios of condom use was most probable.

Preliminary Results: Under the assumptions of scenario 1, 35 fits to Mysore were identified, compared to 0 fits for scenario 2 from 1 million parameter sets. For Belgaum 2 fits for scenario 1 compared to 8 fits for scenario 2.

Discussion: It is more likely that condom use has continued increasing in Mysore, while condom use may have been lower than found in surveys for Belgaum. This method is relatively straightforward to implement and helps to further augment survey findings of behaviours that are prone to reporting biases such as condom use.

Presenting Author	Chandrashekar S
Title of the Presentation	Roll out of Focused HIV/AIDS prevention intervention with HKDHBM (Hijras, Kothis, Double Decker and other Homosexual/Bisexual men) by a Community Based organization. What are the costs? Experience from Karnataka, Southern India

Chandrashekar S, Kumaranayake L, Anthony J, Alary M

Background: The India AIDS Initiative - Avahan project is currently involved in rapid scale up of HIV prevention in India emphasising targeting of high risk populations, using non-governmental organisations (NGOs) and Community Based Organisations (CBO) as the main delivery channel. HKDHBM are a hidden community in India due to criminalisation of their sexual behaviour under Section 377 of Indian Penal Code. Recent Sentinel surveillance (2004) conducted by the State AIDS control society recorded 10% incident HIV infection among MSM in that urban area which excluded hijras who are more vulnerable to HIV infection. Reaching out to this marginalized population with HIV/AIDS prevention intervention is a challenge. This study presents an analysis of costs of roll out of such a programme wherein the Community Based Organisation is the key implementing agency in an urban setting in the Southern Indian state of Karnataka, reaching about 4500 community members of the HKDHBM.

Methods: The first year of scale-up activities in urban district in Karnataka state were examined. The programme components costed were the needs assessment conducted among HKDHBM (sites validation and risk assessment), outreach activities like BCC to reinforce knowledge of HIV/AIDS and STI, and activities to promote safe sex practices, creating enabling environment by providing crisis intervention services, DIC facilities, psychosocial support and clinical services to address STI and Opportunistic infections. Financial and economic costs of implementing activities were retrospectively collected from a provider perspective. Ingredients and step-down allocation processes were used

to measure and allocate costs. Outcomes were measured using routinely collected project data. Costs are in US\$ 2005.

Results: The start-up period in the district for the programme for HKDHBM implemented by the Community Based organization was 4 months. The average start up time for similar programmes implemented by Non-Governmental organization for the Female sex workers in the state was 5.2 months. The economic cost of the programme was US \$ 70,826 to reach 65% of the estimated population in that district of which 27.2% of them are registered in the programme. Recurrent costs constituted 60% of annual economic costs. The costs for contacting one community member at least once was found to be \$ 17, and costs for providing services per registered community member was \$ 42. The costs for providing STI services per community member were \$ 150.

Conclusions: Involvement of Community Based Organisations as key implementing partner for interventions with hidden populations helps in decreasing the start up time and also leads to rapid coverage of majority of the estimated.

Presenting Author	Mathew S
Title of the Presentation	Data Quality Management at the Central Management Information System (MIS) in a large scale project of Avahan India AIDS initiative

Mathew S, Shekhar A, Khobragade S, George PGB, Adhikary R, Ramakrishnan L

Issues: Over the initial phase of the Avahan project each of the Avahan lead implementing partners had developed their own MIS systems. Integrating the data from all the lead partners into a central system and monitoring the quality of the data in a large scale India AIDS Initiative project was a challenge.

Description: The Avahan Initiative is a large-scale HIV prevention intervention, funded by the Bill & Melinda Gates Foundation, which targets high-risk groups in selected districts of the six states most affected by the HIV/AIDS epidemic (Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Nagaland and Manipur) and along the national highways. The Avahan programme monitoring information system (MIS) evolved over the first 3 years of programme implementation. The data quality management entails the establishment and deployment of roles, responsibilities, policies, and procedures concerning the acquisition, maintenance, dissemination, and disposition of data. The paper explains the data quality management system adopted in the Avahan project.

At the initiation of the project each lead implementing partners established M & E structures, functions and capabilities and defined their own indicators. Since the definition of the indicators was not uniform across the partners, the state lead partners, between late 2004 and 2005, with the support of an Avahan-wide monitoring and evaluation grantee (Family Health International) a standard set of core indicators was established. Once the reports were generated by the NGOs on these core set of indicators, there was a need to integrate this into central reporting systems. The lead partners had developed their own systems for data collection. Computerized MIS was

implemented by some of the lead partners while other partners continued with the manual system of record keeping and compilation. Since systems varied across partners, it posed a challenge in integrating all the data into a common central system. Taking these factors into consideration, a system was developed to collect the data into a central web repository system from the lead partners using the monthly indicator reporting format as an object of integration. The provision was given for the partners to upload the reports into the central system on their own. Data consistency and validation checks were incorporated within the system that would help the partners themselves to view the data errors and take necessary corrective action at the time of report uploading. A timeline was set in consultation with the partners for uploading the reports for each month. Additional checks and analyses were carried out by the technical assistance partner-FHI for providing immediate feedback. FHI also provided support in terms of ensuring data quality by addressing issues that may arise due to incorrect mapping of indicators, logical errors in the computerized system at the partner level, incorrect understanding of the indicator definitions across partners, staff capacity building, etc. The system provided the utility of generation of reports and a quick access to data for different time periods at different levels and carry out data analyses for using of the data for program monitoring purpose. Computerized data compilation and consolidation from project level to the PAN Avahan level reduced manual and data compilation errors and also time involved in report compilations. A thorough testing of the system was carried out to ensure that the reports uploaded by the partners are correctly stored in the data repository and reflected in the report outputs.

Another important aspect was provision to add meaningful notes or comments on the data. This helped state lead partners to understand and document the reasons for any insignificant variations in the data whether it is for any programmatic reasons or any issues in reporting. Apart from capturing the information on the indicators, other suitable

information like the details of the projects/NGOs helped in monitoring the projects started, closed or transitioned to the national program. Few indicators like the ever contacted by the project or ever availing clinical services required special considerations as these had to be included in the aggregate levels even if the project/NGO is closed or transitioned

Lessons learned: It is essential to set up common M & E structures, functions and capabilities and developing indicator and reporting guidelines at an initial phase for a good CMIS. Setting up of automated systems of data collation and verification saves considerable time and effort in ensuring quality data collection at the central data repository. This is supported by the fact that after setting up the systems, the reports had lesser consistency issues and quality data was available within the given timeline for all the lead implementing partners. Tools to support data review and analyses are very vital for knowing data gaps and improving on data quality. Providing meaningful notes on the data helps in understanding key factors contributing to any major fluctuation in data or any data related issues.

Carrying out data quality audits for verifying the quality of the reported data and assessing the underlying management and reporting systems would help in identifying the gaps in the system for initiating necessary actions. Quality data contributes for better translation of data into information utilized for program review and monitoring

Next steps: To improvise on the central system which would support implementing partners to easily manage the data, provide a quick and easy access to data and carry out data review and analyses that would support in providing useful information for better program monitoring.

Presenting Author	Ramachandra SS
Title of the Presentation	Creating a stronger evidence base for program planning and implementation: HIV /AIDS data triangulation in Andhra Pradesh, India

Ramachandra SS, Chandran A, Kumar P, Chava N, Chole K, Das M, Ramesh BM, Raj Y, Venkatesh S

Introduction: Till recently, until National AIDS Control Programme 2 (NACP-2) of the National AIDS Control Organization (NACO), there was comparatively limited data on the STI / HIV / AIDS situation within the states in India. But in National AIDS Control Programme 3 (NACP-3), with a massive scale up of various STI / HIV / AIDS prevention programmes and also with better services and improved monitoring and evaluation, there is now a wealth of data available within the State AIDS Control Societies (SACS). The Management Information System (MIS) has also been strengthened and hence a more complete and reliable data is available for analysis.

With this background NACO commissioned an epidemiological profiling of HIV/AIDS situation at district and sub-district level using data triangulation (DT). This was initially piloted in 7 states of India namely Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Uttar Pradesh, West Bengal and Gujarat and is being scaled up to other states in a phased manner. Various agencies were involved as state lead partners for conducting the data triangulation work with support from the respective SACS.

In the state of Andhra Pradesh, Indian Institute of Public Health (IIPH), Hyderabad was involved as the state lead agency for conducting this exercise with support and guidance from the Andhra Pradesh SACS, India Health Action Trust (IHAT) and NACO.

Objectives: The objectives of this exercise were to:

- a. Prepare a profile of HIV epidemic at the district and sub-district levels

- b. Build capacity of Monitoring and Evaluation (M & E) Officers, State Epidemiologists, district and sub-district level M & E teams on data triangulation processes and translate outputs into relevant knowledge products
- c. Prepare a district-level action plan based on an analysis of gaps in response and information

Methods: STI / HIV / AIDS data available from various sources (projects / programmes) such as the HIV Sentinel Surveillance (HSS) data, Anti Retroviral Therapy (ART) data, Targeted Interventions (TI) data, blood bank data, Voluntary Counselling and Testing Centre (VCTC) data, Prevention of Parent to Child Transmission (PPTCT) data, National Family Health Survey (NFHS) data, Integrated Behavioural and Biological Assay (IBBA) data and any other published / unpublished data available within the state and districts, were triangulated to arrive at more realistic and accurate figures of levels, trends, differentials and drivers of the HIV / AIDS epidemic within the states where the study was conducted.

Results: This paper would document the actual process of data triangulation that was undertaken and also describe the key findings for the state of Andhra Pradesh.

For the first time in the country, actual district and sub-district level information with respect to HIV / AIDS is available as a result of the data triangulation exercise. Earlier, in NACP-2, districts within the state were categorized into High / Medium / Low prevalence districts based on the HSS data; now from the results of this study, an evidence based re-categorization of the districts could be looked at. This study has far reaching implications on determining the actual program gaps in terms of service availability, coverage and response. It helps in program planning in terms of prioritization of high risk groups, prioritization of geographic areas based on high prevalence, reallocation of resources (money, manpower, service provision), setting up of new facilities and scaling up of the programme and further strengthening it.

Presenting Author	Deering KN
Title of the Presentation	The impact of out-migrants and out-migration on the HIV/AIDS epidemic: a case study from south-west India

Deering KN, Vickerman P, Moses S, Ramesh BM, Blanchard JF, Boily MC.

Objective: Seasonal migration may be an important driver of the HIV epidemic in India; however, migrant sexual behaviour data are limited. This study assessed the extent to which migration could explain heterogeneity in HIV prevalence in Bagalkot district, in Karnataka state, India, examining important migration-related risk factors for HIV transmission and implications for prevention.

Design: We used mathematical modelling to explore the potential impact of different seasonal migration patterns on HIV prevalence.

Methods: A deterministic compartmental mathematical model of heterosexually transmitted HIV infection was developed. Six migration scenarios were explored, depending on which population migrated (men/clients only/female sex workers; FSW), and which local population determined the demand for commercial sex while migrants were away.

Results: The impact of migration varied substantially across the six migration scenarios. Migration was unlikely to explain heterogeneity in HIV prevalence unless a fraction of all men migrated and local FSW drove the demand for commercial sex. Even with very high-risk migrant sexual behaviour in the migration destination, targeting interventions at 30%-100% of local core groups could prevent a maximum of 12%-40% of new infections (87% effective condoms), from 2004-2015. Targeting migrants locally and at their destination could have up to 1.6-times the impact of targeting migrants only at their destination.

Conclusions: Results suggest that core group interventions introduced locally because of the difficulty of reaching migrant populations could still be beneficial. Understanding how local sexual networks change during migration is crucial for understanding the impact of migration on HIV transmission, and for designing HIV preventive interventions.

Presenting Author	Deering KN
Title of the Presentation	Understanding bias in the self-reported numbers of client partners of female sex workers in Karnataka state, south India

Deering KN, Blanchard JF, Moses S, Ramesh BM, Isac S, Boily MC

Presented at XVIII Biennial Meeting of the International Society for STD Research (ISSTD), London, United Kingdom, June 28 – July 1, 2009

Introduction: Self-reported data on sexual behaviour may be biased for many reasons (e.g. recall bias). We studied the factors that influence measures of self-reported numbers of client partners of female sex workers (FSWs) per month (clients/month) within five districts in Karnataka.

Methods: Based on questions asked to FSWs in a survey support by the India AIDS Initiative of the Bill & Melinda Gates Foundation, frequency measures of clients/month were defined (clients per last day, typical day and typical week); as well as time period estimates (days worked per typical month, and week*4.3). Additionally, four measures of bias were calculated as the difference between four of the five frequency measures and the fifth measure, with the smallest district-level average ([clients/last day]*days per month entertained clients) and variance. Pearson correlation coefficients (PCC) were calculated for frequency and bias measures respectively. Negative binomial regression was used to examine the relationship between characteristics of FSWs and the five frequency measures of clients/month.

Results: Overall, ~2280 FSWs were included. Average bias measures combining districts were significantly different from zero (bias 1-4=1.6-8.6 clients/month). The five frequency measures for clients/month were all significantly positively correlated, with greater

correlation across similar measures for frequency estimates (0.93-0.98, $p < 0.001$) than similar measures for time period estimates (PCC=0.72-0.78, $p < 0.001$). Across the five frequency measures, effect sizes and tests of significance were similar for variables including age, marital status, duration of sex work, typology of sex work education and doing other paid work.

Conclusions: In multivariate analysis, trends are preserved across the five frequency measures for the self-reported numbers of clients per FSW per month. Stronger correlations were observed for measures with the same frequency estimate (e.g. typical) versus time period (e.g. days per month).

Presenting Author	Sgaier SK
Title of the Presentation	Prevalence and correlates of Herpes Simplex Virus-2 and syphilis infections in the general population in India

Sgaier SK, Mony P, Jayakumar S, McLaughlin C, Arora P, Kumar R, Bhatia P, Jha P.

Background: To determine the prevalence and correlates of Herpes Simplex Virus-2 (HSV-2) and syphilis infections in the general population in India.

Methods: 2456 adults were surveyed in Hyderabad, Bangalore and Chandigarh in India. Socio-demographic and lifestyle characteristics were obtained through a questionnaire, and a dried blood spot (DBS) was collected from all individuals aged 18 and over; sexual behaviour was collected from those aged 18e49 years. DBS samples were tested for HSV-2 and syphilis serology. The association between HSV-2 and syphilis infections with socio-demographic and behavioural variables was analysed using multivariable logistic regression.

Results: The prevalence of HSV-2 and syphilis was 10.1% and 1.7%, respectively. Geographic differences in HSV-2 prevalence were significant, while for syphilis it was comparable. Urban/rural differences in prevalence were only seen for syphilis. For both infections, the prevalence between males and females was not significantly different. In males and females, HSV-2 prevalence increased significantly with increasing age; for syphilis, a slight trend was seen only in females. In a multivariable analysis, HSV-2 infection in males and females was associated with site, religion and testing positive for syphilis, in addition to reporting \$2 lifetime partners in the previous year among males and being ever married or having had sex with a non-regular partner in the last year among females.

Conclusions: The burden and geographic heterogeneity of HSV-2 and syphilis infections in India are significant. A national household and DBS-based sexually transmitted infection (STI) surveillance system would enable monitoring, especially in relation to the HIV epidemic, and planning of evidence-based prevention and treatment programmes.

ANNEX 1		
List of Abstracts Selected for Oral Presentation		
S. No.	Abstract Title	Presenting/ First Author
Clinical and Biomedical Studies		
1	Study to determine the onset of NVP related anti-HIV Drug Resistance mutations at 2-4 months, 6-8 months and 10-14 months following administration of single dose NVP given to HIV infected mother to prevent transmission of HIV to the infant	Tripathy S
2	Response to treatment with Nevirapine based versus Efavirenz based antiretroviral therapy regimens in ART naïve HIV infected patients with active Tuberculosis in Pune, India	Tripathy S
3	Study of prevalence and types of baseline HIV drug resistance in the antiretroviral treatment-naïve HIV infected Northern India population	Ahmad H
4	Suboptimal adherence predicts virologic failure and resistance mutations among patients on first-line HAART in Bangalore, India	Shet A
5	Increase in CD4 cell counts between 2 and 3.5 years after initiation of antiretroviral therapy and determinants of CD4 progression in India	Rajasekaran S
6	Efficacy of antiretroviral therapy program in children in India: prognostic factors and survival analysis	Rajasekaran S
7	Post-HAART tuberculosis in adults and adolescents with HIV in India: incidence, clinical and immunological profile	Rajasekaran S
8	Predictors of failure of first-line antiretroviral therapy in HIV-infected adults: Indian experience	Rajasekaran S
9	Long term follow up of HIV-infected patients with tuberculosis treated with 6-month intermittent short course chemotherapy	Bhawani PK
10	Interim results: Evaluation of safety and efficacy of two different once daily anti-retroviral treatment regimens along with antituberculosis treatment in patients with HIV-1 and Tuberculosis – Randomized Controlled Clinical Trial	Bhawani PK
11	Safety and Immunogenicity of DNA prime and Modified Vaccinia Ankara Virus HIV subtype C Vaccine boost in Indian volunteers	Ramanathan VD
12	Prevalence and clinical management of common sexually transmitted infections among female sex workers in India	Das A
Basic Sciences		
13	Generation of HIV-1 subtype C base DNA vaccine candidates assessment of prime boost immunization strategy in mouse model	Tripathy S
14	Augmentation of natural killer activity with exogenous interleukins in patients with HIV and pulmonary tuberculosis	Ramana Rao PV

	coinfection.	
15	Natural-Killer Cell-Derived Cytolytic Molecules in HIV-Associated Pulmonary Tuberculosis-Role of Exogenous Interleukins	Ramana Rao PV
16	Natural killer cell-mediated cytokine response among HIV-positive south Indians with pulmonary tuberculosis	Ramana Rao PV
17	Steady-State Pharmacokinetics of Nevirapine in HIV-1 Infected Adults in India.	Ramachandran G
Socio Behavioural Studies		
18	Factors affecting enrolment of PLHAs in India	Sarna A
19	Male Out-Migration and HIV among men and women in districts with high out-migration: Findings from a case-control study	Saggurti N
20	Higher levels of HIV-related risky behaviour reported in polling booth surveys compared to face-to-face interviews in a general population survey in Mysore district, Karnataka state, Southern India	Bradley JE
21	Reaching the un-reached: An exploratory Study of Hidden and Difficult to Reach Sex Workers in Tamil Nadu	Christina DT
22	The link between mobility and HIV risk among recent male migrants in Karnataka, India	Halli S
23	Anal Sex Practices amongst Female Sex Workers in Andhra Pradesh	Tucker S
Evaluation Studies		
24	Impact Assessment of Targeted Intervention on Heterosexual Transmission of HIV in India	Kumar R
25	Assessment of the access and utilization of PPTCT Services	Dutta D
26	Mid-Term Review of the National STI/RTI Control & Prevention Programme	Chan P
27	Levels and trends in HIV and STI prevalence in Bagalkot District based on general population surveys conducted in 2003 and 2009	Rajaram S
28	HIV mortality and infection in India: Estimates from nationally representative mortality survey of 1.1 million homes	Jha P
29	Opioid substitution therapy in Manipur and Nagaland, north-east India: operational research in action	Kermode M
30	Two-year treatment outcomes of patients enrolled in India's national first-line antiretroviral therapy programme	Rewari BB
31	Changes in risk behaviours and STI prevalence, following HIV preventive interventions among female sex workers in five districts in Karnataka state, south India	Isac S

ANNEX 2		
List of Abstracts Selected for Poster Presentation		
S. No.	Abstract Title	Presenting/ First Author
Clinical and Biomedical Studies		
1	Plasma nevirapine levels and antiretroviral efficacy of treatment in HIV-TB co-infected Indian patients receiving highly active antiretroviral therapy along with rifampicin based antituberculosis treatment	Shah N
2	Growth retardation and anemia among HIV-infected children in South India: need for targeted nutritional interventions	Shet A
3	Causes and features of anemia among children with HIV infection in South India	Shet A
4	Conducting mobile phone based HIV health interventions: considerations of perception and design	Shet A
5	Mycobacterium avium complex (MAC) related Immune Reconstitution Inflammatory Syndrome (IRIS) in an HIV-infected Child	Shet A
6	"Unmasking" Cryptococcal Lymphadenitis: An Unusual Manifestation of HIV- associated Immune Reconstitution Inflammatory Syndrome (IRIS)	Shet A
7	HIV coinfection among multidrug resistant and extensively drug resistant tuberculosis patients--a trend	Rajasekaran S
8	Carriage of Candida species in oral cavities of HIV infected patients in South India.	Girish Kumar CP
9	Miliary tuberculosis in human immunodeficiency virus infected patients not on antiretroviral therapy: clinical profile and response to short-course chemotherapy	Bhawani PK
10	Immune Reconstitution Tuberculosis in HIV Patients after Antiretroviral Therapy.	Rajasekaran S
11	Increasing nevirapine dose can overcome reduced bioavailability due to rifampicin coadministration	Ramachandran G
12	Effect of HIV on pharmacokinetics of antituberculosis drugs	Ramachandran G
13	Decreased bioavailability of rifampin and other antituberculosis drugs in patients with advanced human immunodeficiency virus disease	Ramachandran G
14	Malabsorption of rifampin and isoniazid in HIV-infected patients with and without tuberculosis	Ramachandran G
15	Decreased bioavailability of rifampicin and other anti-TB drugs in patients with advanced HIV disease	Ramachandran G
16	Study of Adverse Cutaneous Drug Reactions in HIV positive individuals	Rao AG
17	Etiology and determinants of sexually transmitted infections in Karnataka state, south India	Becker M

18	Diarrheal disease among HIV-infected adults in Karnataka, India: evaluation of risk factors and etiology	Becker M
19	HIV Seropositives on antiretroviral therapy at Bowring and Lady Curzon Hospital: A Five Year Experience {2004- 2009}.	Prabhakar B
20	Decreased Bioavailability of rifampin and other anti-tuberculosis drugs in patients with advance HIV diseases.	Prabhakar B
21	Incidence of Zidovudine induced anaemia among HIV-Seropositives on ART at Bowring & Lady Curzon Hospital.	Prabhakar B
Basic Sciences		
22	Co-receptor tropism prediction in Indian HIV-1 subtype C sequences: Future Therapeutic implications for India	Neogi U
23	Comparison of interferon gamma and interferon gamma-inducible protein-10 secretion in HIV-tuberculosis patients	Kabeer BS
24	CYP2B6 G516T polymorphism but not rifampin coadministration influences steady-state pharmacokinetics of efavirenz in human immunodeficiency virus-infected patients in South India	Ramachandran G
25	Study of ABCB1 polymorphism (C3435T) in HIV-1-infected individuals from South India	Ramachandran G
Socio Behavioural Studies		
26	Population based study on HIV prevalence in Nagaland	Sogarwal R
27	Psychosocial need and stresses in people infected with HIV/AIDS	Sahay S
28	Utilization of Private Medical Services by People Living with HIV/AIDS in Tamil Nadu: Willingness to Pay	Edwin SA
29	Changes in knowledge and attitudes around HIV/AIDS in the general population of a high HIV risk district in Karnataka	Bradley J
30	Advocacy Strategies For Recruitment of Volunteers for Phase I HIV Vaccine Trials In Chennai, India	Kumar MM
31	Perceptions of Women living with AIDS in Rural India related to the Engagement of HIV-Trained Accredited Social Health Activists for Care and Support	Chandrashekhar R
32	Male use of female sex work in India: a nationally representative behavioural survey	Arora P
33	HIV, HSV-2 and syphilis among married couples in India:	Arora P
34	What Impede Universal Access for Women and Girls in India? A study of Female Sex Workers in Pune	Nanda P
35	Power, community mobilization, and condom use practices among female sex workers in Andhra Pradesh, India	Blankenship KM
36	Migration/mobility and risk factors for HIV among female sex workers in Andhra Pradesh, India: implications for HIV prevention +	Reed E
37	The Context of Economic Insecurity and Its Relation to Violence and Risk Factors for HIV Among Female Sex Workers in Andhra Pradesh, India	Reed E

38	Challenging the Stigmatization of Female Sex Workers through a Community Led Structural Intervention: Learning from a Case Study of a Female Sex Worker Intervention in Andhra Pradesh, India	Blankenship KM
39	HIV Transmission in Intimate Partner Relationships in India	Saggurti N
40	Buddies and daddies: how social capital mediates migrants' HIV risk at destination	Singh D
41	HIV risk associated with mobile female sex workers in the context of jatras (festivals) in Karnataka, India	Halli S
42	Vulnerabilities associated with migration of female sex workers (FSWs) in brothel settings in India	Gurav K
43	Distribution of rural sex work in India: implications for HIV prevention strategies	Isac S
44	Is condom use practice among female sex workers dependent on the type of the sexual partnership?	Gurav K
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