vaccines, microbicides, barrier methods, circumcision and behavioural prevention interventions, and assessed possible factors associated with success and failure to achieve anticipated outcomes.

Results Of the hundreds of prevention trials conducted over the past decade, only six reported significant findings, of which three were male circumcision trials, with one each for prophylactic vaccines, Truvada for PREP, and TDF+FTC microbicide gel. Most biomedical prevention trials rely on patient reports of adherence to use, and generally adherence is significantly lower than advised. Condom use among treatment arms are also usually lower than in control arms, which when linked with insufficient product use, leads to increased risk of disease acquisition. Repeated behavioural prevention counselling, HIV testing, STD detection and treatment all lead to diminished reports of risk behaviour among both intervention and control participants, diminishing the statistical power of the planned trials. IRB requirements may lead to control conditions that provide prevention services dramatically greater than is involved in "usual care". RCTs which randomise individuals can also lead to significant cross-exposure among treatment arms.

Conclusions Alternative to the RCT Conclusions: Design alternatives to the individual or community randomised controlled trial may be required in the future. Increased attention to improving adherence to recommended use of prevention approaches which must repeatedly conducted (eg, use of a microbicide before each sex act), and alternatives to enriching control conditions above that of usual care should be considered, while maintaining fidelity to ethical conduct of research.

P1-S6.04 EDUCATION AND LIFETIME RISK OF HIV INFECTION IN MANICALAND, ZIMBABWE

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Background There is evidence that attendance at school is protective against HIV among young people in South Africa. Further work is required to investigate the effect of education on the life-time risk of HIV in sub-Saharan Africa. In this paper, we have examined the association between education and HIV infection/sexual risk behaviour among men and women of different ages in Zimbabwe.

Methods The effects of education level (none or primary only; secondary or higher) on prevalent HIV infection and sexual risk behaviours among young people of school age (15—21 years) and older adults (22—54 years) were investigated using data from four rounds of an open cohort study collected between 1999 and 2008 in Manicaland, Eastern Zimbabwe. Multivariate regression models were used to investigate the independent effects of education, marriage and wealth.

Results School-aged men, interviewed in 1999/2000, with secondary or higher education had significantly reduced risk of HIV infection compared to those with none or primary education only (adjusted OR=0.35; p=0.011). For older men, the effect of education level was not significantly associated with HIV risk (adjusted OR=1.17; p=0.125). For those interviewed in 2006/2008, education level was not found to be independently associated with HIV infection among school-aged or older men. At both time points, marital status and living in a town were independent risk factors for HIV among older men. Among women interviewed in 1999/2000, adjusted models indicate that a higher level of education had a significant protective effect for school-aged (adjusted OR=0.64; p=0.023) and older (adjusted OR=0.80; p=0.017) women. For those interviewed in 2006/2008, a higher level of education level was protective among school-aged (adjusted OR=0.56; p=0.040) but not older (adjusted OR=0.99; p=0.940) women. Marital status was an independent risk factors for HIV infection fort women of all ages.

Conclusions There is evidence that secondary or higher education is protective against HIV infection among school-aged people in Zimbabwe, particularly women. Among older men, education does not appear to be protective against HIV. In 1999/2000, secondary or higher education was protective against HIV among older women. However, in 2006/2008, this protective effect was reduced. Further work to calculate the lifetime cumulative risk of HIV infection by education level, in this population, will be conducted.

P1-S6.05 INFLUENCE OF SOCIAL SUPPORT NETWORKS ON THE HIV TRANSMISSION RISK BEHAVIOURS OF PEOPLE LIVING WITH HIV IN MANITOBA, CANADA

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For people living with HIV/AIDS (PLWHA) positive social support networks (SSNs) can help improve quality of life, overall well-being, coping, and decrease mood disturbance, morbidity, mortality, sexual and substance associated HIV transmission risk factors. However, HIV diagnosis can cause a negative change in SSNs leading to social isolation (actual/perceived) and increase risk of HIV transmission behaviours. Having an effective strategy to encourage the development/maintenance of SSNs may have a positive effect upon the health outcomes and HIV transmission risk behaviours of PLWHA.

Objective To describe the SSNs of Manitobans living with HIV/AIDS (MLHA) and determine the influence of SSNs on transmission risk behaviour. The relationship between independent variable (size and type of SSNs- positive/negative) and dependant variables (sexual risk behaviour, and alcohol, injection and non-injection drug use) was examined. Control variables included: age, gender, ethnicity, time since diagnosis, and sexual orientation. This data was collected in the Positive Prevention Study (PPS), a cross-sectional survey which included 135 MLHA aged 18 plus. The PPS assessed a broad list of transmission related determinants and only enrolled people if they were aware of their HIV diagnosis for at least 6 months, allowing for analysis of sustained positive behavioural changes. For this analysis SAS statistical software was used. Analysis of variance was done between the size and type (positive/negative) of SSNs and the chosen transmission risk behaviours; sexual behaviour, alcohol use, injection and non-injection drug use. Analysis of covariance was conducted with independent, dependent and control variables. Multiple regression analysis was run with independent and dependent variables to determine any relation. Level of social support achievable depends on one's attachment to those in their SSN and the role they play. It is not just the quantity of people but also the quality of relationships (eg, frequency, perceived support) that defines the success of SSNs. Not all SSNs are positive; some types may increase transmission risk behaviour. Only positive SSNs (regardless of size) are associated with avoidance of transmission risk behaviours. The results of this study help to assess the degree to which SSNs affect the sustainability of long-term secondary prevention measures, and thus inform groups offering services to MLHA with local scientific evidence.

P1-S6.06 WHAT HAS BEEN THE EFFECT OF THE AVAHAN HIV INTERVENTION ON CONDOM USE AMONG FEMALE SEX WORKERS? INSIGHTS FROM A FULLY BAYESIAN INFERENCE METHODOLOGY

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Background Considerable efforts have been invested to evaluate the impact of the Avahan project, the India AIDS initiative, targeted to high risk groups. One measure of impact is the number of HIV infections prevented (PF) due to increases in condom use between FSWs and clients following the start of Avahan. PF estimates hinge on knowledge of the frequency of condom use over time. As there is no data on condom use prior to the first round of data collection post-Avahan, these trends must be estimated indirectly. We aim, using a Bayesian framework and Monte Carlo Markov Chains (MCMC) methodology, to determine if the trends in HIV prevalence among FSWs and clients can be used to infer changes in condom use between FSW and clients before and after the start of Avahan.

Methods We used serial rounds of cross-sectional behavioural and biological survey (IBBA) data and a deterministic compartmental model of HIV transmission among FSW/clients in Mysore and Belgaum districts coupled with Bayesian inference procedures. Condom use was modelled as the fraction of FSW commercial sex acts protected by condoms. IBBA data was used to specify the model prior parameter distributions and estimate HIV prevalence at three time points among FWS, at one time point among their clients. The Particle MCMC algorithm was used to explore the posterior density of our complex parameter distribution, and to derive estimates of the evolution of condom use over time using either 2 or 3 rounds of HIV prevalence data among FSW.

Results For both districts, the results reveal a clear increase in condom use around the start of Avahan in 2004 (Abstract P1-S6.06 figure 1). Abstract P1-S6.06 figure 1 suggests condom use before the intervention (jan 1994) was lower in Mysore (15.7%, 95% CI 0 to 48%) than in Belgaum (19%, 95% CI 0 to 58%). In both districts, post intervention condom use stabilised at values above 80% (95% CI Mysore 65 to 100% and Belgaum 50 to 100%). Lastly, Abstract P1-S6.06 figure 1 A),C) vs B),D) show the information gained by using 3 rounds of data instead of 2.
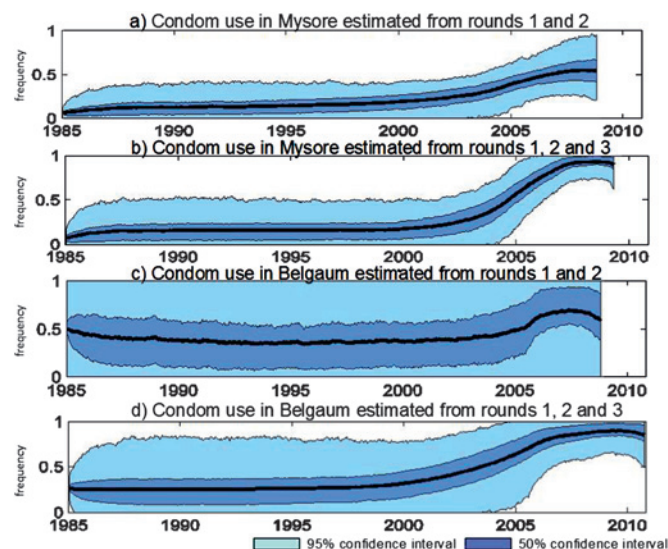
Abstract P1-S6.06 Figure 1   A) Condom use in Mysore estimated from rounds 1 and 2. B) Condom use in Mysore estimated from rounds 1, 2 and 3. C) Condom use in Belgaum estimated from rounds 1 and 2. D) Condom use in Belgaum estimated from rounds 1, 2 and 3.

Conclusions This is the first application of Particle MCMC in an intervention monitoring context. Our results consolidate previous back projections suggesting that condom use significantly increased since the start of Avahan, which sheds additional light on the potential intervention impact. This study illustrates the use of flexible Bayesian inference methodology to estimate time-varying parameters. It also informs the design of prevalence surveys for intervention monitoring.

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Background Avahan is a large scale intervention that targets high-risk groups, including female sex workers (FSW), in many epidemiologically heterogeneous districts in southern India. Changes in HIV prevalence post intervention may depend on setting and intervention characteristics. We conducted an ecological analysis to identify which factors were associated with greater changes in FSW HIV prevalence after Avahan start in 2004.

Methods All variables were derived from two serial rounds (R1, R2) of cross-sectional FSW surveys, conducted ~3–4 years apart, from 24 districts of 4 Southern Indian states. We examined the

Abstract P1-S6.07 Table 1   Results of univariate analysis between the difference in FSW HIV prevalence (R2-R1) and different independent variables for each class of factors

Types of independent variables	N	Coefficient of correlation (r) (if pv <0.1)	p value
Intervention factors			
Difference* in consistent condom use (CCU) by FSW with occasional clients	27	—	ns
Difference in Syphilis (Tp) prevalence	23	0.36	0.06
Difference in HSV-2 prevalence (D.FSW HSV2)	27	0.45	0.03
Difference in gonorrhoea or Chlamydia prevalence	27	—	ns
Difference in the fraction tested for HIV	27	—	ns
%FSW contacted by NGO at R1	27	—	ns
%FSW who visited NGO clinic at R1	27	—	ns
%FSW who received condom from NGO at R1	27	—	ns
Baseline contextual factors (mainly at R1)			
R1 FSW HIV prevalence	27	−0.53	<0.01
R1 Syphilis (Tp) prevalence	27	−0.41	0.03
R1 HSV-2 prevalence	27	−0.55	<0.01
R1 Gonorrhoea or Chlamydia prevalence	27	—	ns
R1 % of FSW ever been asked for anal intercourse (R1 AI)	27	−0.34	0.08
R1 weekly client number per FSW	27	—	ns
R1 % FSW who are brothel based	26	—	ns
R1 % FSW tested for HIV	27	—	ns
Estimated CCU by FSW with occasional clients in 1998†	20	—	ns
Estimated increase in CCU with occasional clients before R1†	21	—	ns
Design factors (related to conduct of surveys)			
Date of R1	27	—	ns
Time between R1 and R2	27	—	ns
Difference in response rate between survey rounds (R2−R1)	27	−0.39	0.06
Contextual changes (difference between survey round (R2−R1))			
Differences in weekly client number per FSW	27	—	ns
Difference in the % FSW ever asked for AI	27	0.35	0.08
Different in the fraction of FSW who are literate	27	—	ns
Difference in the fraction of married FSW	27	—	ns
Difference in % FSW brothel based	26	—	ns
Difference in mean duration of sex work for FSW	27	—	ns

*Difference between rounds (R2−R1).
†Adapted from Lowndes et al STI (2009).