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Research paper

An assessment of an HIV prevention intervention among People Who Inject Drugs in the states of Manipur and Nagaland, India

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ABSTRACT

Background: The present study describes an assessment of a large-scale intervention, "Avahan", using an evaluation framework that assesses the program coverage, changes in injection patterns, condom use, and STI and HIV prevalence among People Who Inject Drugs (PWID) in two states of India – Manipur and Nagaland.

Methods: Program monitoring data and results from two rounds of a cross sectional biological and behavioural surveys in 2006 (Round 1) and 2009 (Round 2) were used. The sample included 839 and 860 PWIDs from Manipur and 821 and 829 PWIDs from Nagaland in Round 1 and Round 2 respectively for current analysis. Bivariate and multivariate analyses were done to measure the changes in behavioural and biological outcomes between the two rounds and to examine the association between programme exposure and behavioural outcomes.

Results: In Manipur, about 77% of the PWIDs were contacted by the peer educators/outreach workers every month and about 18% of the PWIDs visited the clinic every month by March 2010. In Nagaland, however, the proportion of PWIDs visiting the clinic monthly remained low (11% in March 2010). PWIDs in both states were more likely to report 'consistent safe injection practice in the last six months' in Round 2 compared to Round 1 (Manipur: adjusted odds ratio (aOR): 1.88, 95% confidence intervals (CI): 1.46–2.43; Nagaland: aOR: 2.35, 95% CI: 1.86–2.80) PWIDs were also more likely to report consistent condom use with regular partners in Round 2. The prevalence of Hepatitis B virus (HBV) increased in Round 2 in Manipur (11% vs 6%, $p < 0.001$) and Nagaland (8% vs 6%, $p = 0.05$). The prevalence of Hepatitis C virus (HCV) was high and did not change, either in Manipur (67.3% vs 69.9%, $p = 0.42$) and Nagaland (14.7% vs 15.1%, $p = 0.82$). Similarly, the prevalence of HIV did not change significantly between the two Rounds either in Manipur (27.8% in Round 1 vs 29.2% in Round 2, $p = 0.59$) or in Nagaland (1.2% in Round 1 and 1.6% in Round 2 of the IBBA, $p = 0.82$).

Conclusion: Improvements in safe injection practices and consistent condom use with regular partners suggest effectiveness of prevention efforts. However, increase in HBV prevalence and non-decline in HCV and HIV prevalence in both the states also underscore the need to continue and intensify targeted interventions (such as Hepatitis B vaccination, needle exchange programmes, condom distribution) for long term risk reduction among PWID population.

Introduction

The HIV epidemic in India is concentrated among high-risk groups like female sex workers (FSW) and their clients, sexually transmitted infections (STI) clinic attendees, men who have sex with men (MSM), male-to-female transgendered people, and People Who Inject Drugs (PWID). The recent HIV sentinel surveillance

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2010–2011 shows that HIV prevalence among antenatal clinic attendees (considered representative of the general population) is low (0.4%), and that HIV prevalence is higher among the high risk groups. According to the surveillance report, the prevalence was 2.7% among FSWs, 4.4% among MSM, and 7.1% among PWIDs; thus, PWIDs have the highest HIV prevalence among the high risk groups in India on average (National AIDS Control Organisation, 2012). Furthermore, PWIDs are also at high risk of infection with blood-borne viruses such as Hepatitis B and Hepatitis C (Horton & Das, 2010). It has been reported that the prevalence of Hepatitis B surface antigen was 3.8% and the prevalence of Hepatitis C was as high as 47.8% (Mahanta, Borkakoty, Das, & Chelleng, 2009). The National AIDS Control Organization (NACO) of India in its third phase considers prevention interventions among PWIDs as a key thrust area; thus, there is an emphasis on targeted interventions in these groups to encourage safe injecting practices (National AIDS Control Organisation, 2012).

India, with a population of 1.2 billion, is a huge and diverse country comprising of 28 states and seven union territories (National Portal of India, 2014). In 2002, six states were considered to be high prevalence states. Of these, Manipur and Nagaland, the two north-eastern states were considered as high prevalence states (in 2002) in India. The HIV epidemic in these states has largely been driven by injecting drug use (Mahanta et al., 2009; Medhi et al., 2011; National AIDS Control Organisation, 2011). Injecting drug use is a serious public health concern in both states, with approximately 2% of the population engaging in injecting (Chandrasekaran et al., 2006), even though the nature of the types of drugs used in both the states may differ. The estimated adult HIV prevalence was 1.4% in Manipur and 0.8% in Nagaland, and among PWIDs, the HIV prevalence was 12.9% in Manipur (2010–2011) and 2.2% in Nagaland (2010–2011) (National AIDS Control Organisation, 2012). Though the HIV prevalence was very high in Manipur (about 80%) in late nineties, it has reduced in the recent years (about 12%) in 2007.

In both these states, the respective State AIDS Control Society (SACS) were the main funders of the HIV programmes and interventions and covered about 50–60% of PWIDs till 2003. "Avahan", the India AIDS Initiative, supported by the Bill & Melinda Gates Foundation is considered to be one of the largest prevention programmes in a single country. Initiated in 2003, it focussed on prevention programmes and targeted interventions in what was considered to be a concentrated epidemic. The intervention programmes were started across various states in high risk groups such as female sex workers and their clients, men who have sex with men, and PWIDs; the population for interventions were based on the nature of the epidemic and key populations in these states (Bertozzi, Padian, & Martz, 2010; Dandona & Benotsch, 2011; Laga & Vuylsteke, 2011; Sgaier et al., 2012). It started interventions among PWIDs in certain selected districts in both Manipur and Nagaland. These districts were selected in consultation with national and state level authorities, so as to avoid duplication of services (Fig. 1a and b). Avahan's main strategies for intervention were: to achieve a high coverage of services including outreach; deliver a package of proven prevention services (provision of free new needle/syringe, abscess management, clinic services for treating of sexually transmitted infections, condom promotion and distribution and empowering the community); and address determinants of HIV risk (sharing needle/syringe, condom use, multiple partners and advocacy to reduce structural barriers to safer injection and sex practices) (Priya Mannava, Pillai, Hazarika, Chandrashekar, & Kermode, 2012).

Avahan's evaluation framework was based on approaches for large-scale public health programs and followed the program's logic model: assess scale-up and coverage; changes in intermediate outcomes (such as safe injecting practice [consistently avoiding injection with a needle/syringe already used by others, drawing drugs from common container], consistent condom use and reduction of STIs); and changes in HIV prevalence among the high risk groups (Bill & Melinda Gates Foundation, 2008a, 2010; Boerma & Weir, 2005). Two rounds of cross-sectional surveys termed Integrated Behavioural and Biological Assessments (IBBA) were conducted in 2006 and 2009 to assess these outcomes.

The present manuscript assesses the role of Avahan intervention on changes in behaviours and HIV/STIs among male PWIDs in Manipur and Nagaland. The specific objectives were: (1) to document the scale-up and intensity of coverage of the Avahan programme; (2) to study self-reported consistent safe injecting practice and their association with the Avahan intervention; (3) to estimate the association between self-reported consistent condom use and Avahan intervention; and (4) to assess the prevalence of STIs and blood-borne infections (including HIV, Hepatitis B, and Hepatitis C) and their association with Avahan intervention.

Methods

This paper uses programme monitoring data, and behavioural and biological data from two cross sectional surveys – the IBBA surveys – conducted in Manipur and Nagaland.

Framework

We developed an analytical evaluation framework based on the Avahan evaluation design (Table 1). The aim of using the framework was to: (1) examine the scale and intensity (based on availability and utilization of services) of Avahan coverage; (2) assess the intermediate outcomes-consistent safe injecting practice and condom use; (3) assess changes in prevalence of STIs including HIV and other blood borne pathogens; and (4) examine the association of exposure to the Avahan interventions and self-reported injecting behaviour, self-reported condom use, and STI prevalence.

Data sources

Avahan program monitoring data

Avahan developed a computerized management information system (CMIS) which collected data on outreach services and clinical services through the course of program implementation (Verma et al., 2010). In each district, NGO partners implementing the Avahan program gathered and reported monthly data on program inputs and infrastructure, outreach services, and clinical service utilization. Data were aggregated and reported to the lead implementing partner at the state level and a subset of indicators was aggregated centrally using the CMIS. Program monitoring data from January 2005 till March 2011 were used to assess trends of programme coverage and uptake of program services.

Integrated Behavioural and Biological Assessment (IBBA)

Two rounds of IBBA were undertaken among male PWIDs in two districts (Bishnupur and Churachandpur) of Manipur and two districts (Phek and Wokha) of Nagaland (Fig. 1a and b). These districts were selected from seven Avahan intervention districts in Manipur and eight in Nagaland; they were chosen purposively based on size of the PWID population (Saidel et al., 2008). The size estimates of PWIDs were 2000 in Bishnupur, 2400 in Churchandrapur, 2200 in Phek, and 3100 in Wokha districts. In Manipur, Avahan's coverage was 100% in Bishnupur, 87% in Churchandrapur, and 100% in both the districts of Nagaland. Thus, Avahan was the sole intervention in three of the four districts of the IBBA and a significant part in the fourth district. Round 1 of the IBBA was conducted in 2006 and Round 2 in 2009. Men aged 18 years or older who reported injecting drugs for non-medical reasons at least once in the last six

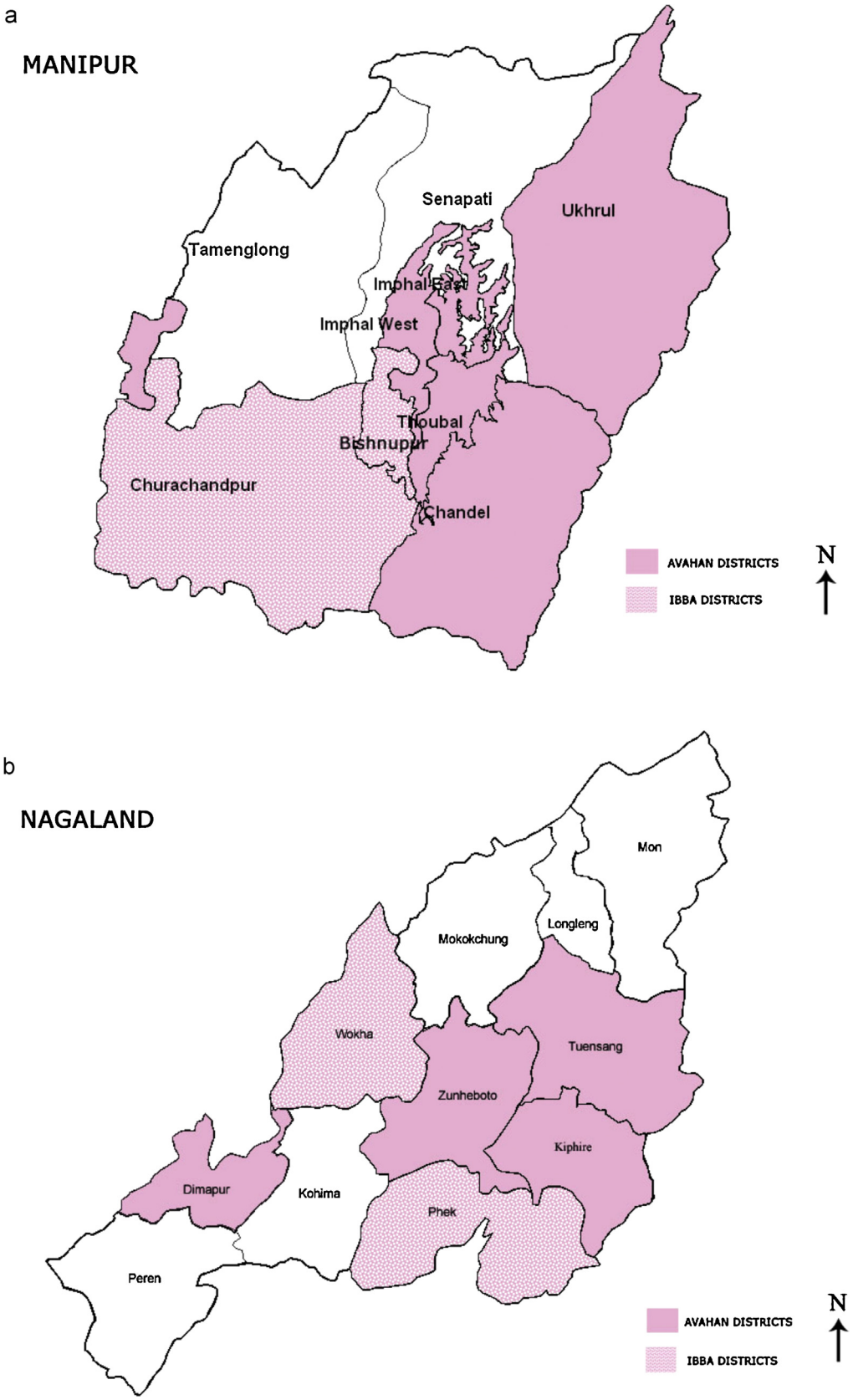

Fig. 1. (a and b) Maps of Manipur and Nagaland – Districts where the Avahan intervention was implemented and districts from where the Integrated Behavioural and Biological Assessment (IBBA) data were collected. *Note*: The coloured regions are the sites in which the Avahan intervention was implemented and the spotted regions indicate the districts (among all Avahan intervention districts) from where the IBBA data were collected.

Table 1
Evaluation framework, indicators and data sources used in analysis.

Research question	Indicator	Data source
1. Is coverage of Avahan adequate?	**A. Scale**	
	a. *Geographical coverage* – Description of rollout in number of districts and change in number of implementing NGOs over time and estimated populations covered by NGO	CMIS
	b. *Proportion of PWIDs ever contacted and ever visited clinic* – Number of PWIDs ever contacted by Avahan peer educators or ever visited Avahan program STI clinics divided by the estimated size of PWIDs as of June 2009	CMIS
	c. Proportion of PWIDs *contacted monthly by peer educators or visited* program *STI clinics for STI consultations* – Number of PWIDs contacted monthly by peer educators or visited program STI clinics monthly divided by the estimated size of PWIDs as of June 2009	CMIS
	d. *Proportion of PWIDs contacted by Peer educator (PE)/Outreach worker (OW) and visited clinic in last month* – Percentage of PWIDs from IBBA who reported that they had been contacted by Avahan peer educators in the past month (Avahan NGOs)	IBBA
	e. *Proportion of PWIDs contacted by PE/OW and visited clinic in last year* – Percentage of PWIDs from IBBA who reported that they had been contacted by Avahan peer educators in the year preceding survey	IBBA
	B. Intensity	
	a. *Ratio of peer educator to the number of PWIDs covered* – The total number of active outreach workers and peer educators in the Avahan intervention areas across implementation districts in Manipur and Nagaland; and number of estimated PWIDs covered per peer educator in the coverage area (target ratio was 1:50)	CMIS
	b. *Needle/syringe distribution* – Number of free needle/syringe distributed by Avahan programme per PWID per month	IBBA
2. Has there been an increase in safe needle/syringe and condom use among PWIDs?	**Change in safe injecting behaviour and condom use pattern**	
	a. Proportion of PWIDs reporting safe injecting (did not inject with a needle previously used by someone else) last time from two rounds of IBBAs	IBBA
	b. Proportion of PWIDs reporting safe injecting consistently from two rounds of IBBAs	IBBA
	c. Proportion of PWIDs reporting last time and consistent condom use with regular female partners from two rounds of IBBAs	IBBA
	d. Proportion of PWIDs who had sex with female sex workers reporting last time and consistent condom use from two rounds of IBBAs	IBBA
3. Has there been reduction in STIs, HIV and Hepatitis prevalence?	**Change in STI prevalence and visits to clinic with STI symptoms**	
	STI prevalence (reactive syphilis serology, gonorrhoea (NG), chlamydia (CT)	IBBA
	Change in HIV prevalence	
	HIV prevalence among PWIDs in two rounds of IBBAs	
	Change in Hepatitis-B and Hepatitis-C prevalence	
	Hepatitis-B and Hepatitis-C prevalence among PWIDs in two rounds of IBBAs	IBBA
4. Is Avahan exposure associated with increase in safe injecting behaviour, condom use and declining STIs?	**Association of program exposure with intermediate outcomes and STIs**	
	a. Avahan program exposures, defined as exposure to any one of contacted by and Avahan peer educator, visited Avahan program clinic, and received needle/syringe/condom from peer educators in past one year. Its association with consistent safe injecting practice and consistent condom use with sexual partners across two rounds of IBBA	
	b. Program exposure, as defined above, and its association with having any STI (NG, CT, reactive syphilis serology or high-titre syphilis) and Hepatitis B and C	IBBA

months were recruited using respondent driven sampling (RDS), a probability-based method of sampling for hidden populations. Eight seeds of diverse characteristics were recruited each from Manipur and ten seeds from Nagaland. Three coupons were distributed to each respondent for further distribution to the peers as part of recruitment process. Both primary and secondary incentives were provided to the respondents. The average network size in Round 1 and Round 2 were respectively 11 and 9 in Manipur, 8 and 7 in Nagaland. Data were collected from 839 (Round 1) and 821 (Round 2) male PWID respondents in Manipur; 860 (Round 1) and 829 (Round 2) respondents in Nagaland. Both the rounds of IBBA collected behavioural information, dry blood spot (DBS – for detection of HIV, syphilis, Hepatitis B Virus [HBV], and Hepatitis C Virus [HCV]), and urine specimen (for detection of *Neisseria gonorrhoea* [NG] and *Chlamydia trachomatis* [CT]).

The fieldwork was conducted by research agencies under the guidance and supervision of Regional Medical Research Centre (RMRC), the State Institute of Indian Council of Medical Research (ICMR) in Assam, and in coordination with the National AIDS Research Institute (NARI). FHI 360 provided technical assistance to conduct both rounds of the IBBA. Informed consent was obtained from the respondents. The survey team was trained in questionnaire administration, sample collection, and transport of biological samples. The IBBA data collection was approved by Protection of Human Subjects Committee (FHI 360), Health Ministry Screening Committee (Indian Council for Medical Research), and the ethical committee of RMRC. Additional details of the IBBA methodology have been discussed elsewhere (Bill & Melinda Gates Foundation, 2008b, 2010; Saidel et al., 2008).

Outcome variables

(i) Programme monitoring indicators from CMIS (Table 1) were used to assess the scale-up, intensity, coverage, and access of Avahan services.
(ii) Behavioural outcomes were self-reported consistent safe injection practice (defined as never sharing needles/syringes with another person) and self-reported consistent condom use (defined as using condom in every sex act).
(iii) Biological outcomes were HIV, syphilis, HBV, and HCV from blood specimens, and NG and CT from urine specimens. HIV positivity was determined by a two-test algorithm using two rapid tests (Microlisa-IV [J. Mitra & Co. Pvt. Ltd.] and Genedia HIV ½ ELISA 3.0 [Greencross Life Sciences]). Nucleic acid amplification (Gen-Probe APTIMA COMBO 2 – Gen-Probe Inc., San Diego, CA) tests on urine samples were done for chlamydia and gonorrhoea. Syphilis serology was carried out using Treponostika TP recombinant (BioMerieux), a solid phase enzyme-linked immunoassay for testing anti-treponemal antibodies using dry blood spot. HBsAg ELISA was carried out on all DBS samples at the state laboratory using Murex HBsAg Version 3 kits (Abbott Diagnostics) and antibodies against

Hepatitis C were tested by Enzyme ImmunoAssay (Murex anti-HCV Version 4.0, Abbott Diagnostics).

(iv) A composite binary variable for exposure to Avahan intervention was created using three parameters which included the variables: (a) contact with peer educator; (b) received needles/syringes from outreach workers; and (c) visited the clinic/drop-in centre. If the response was 'yes' to any of the three variables, the composite variable was coded as exposed. We examined the association between exposure to Avahan intervention, and the biological and behavioural outcomes.

Statistical analyses

Data were analyzed and presented separately for Manipur and Nagaland. Descriptive analyses were done using RDSAT 5.6 (Volz, Wejnert, Degani, & Heckathorn, 2007); we calculated the proportions and confidence intervals for the socio-demographics, behavioural variables, exposure to Avahan intervention, and biological outcomes. The descriptive data represent population weighted estimates. We generated unique seed numbers and the coupon numbers were reconstructed to carry out aggregate level univariate analysis using RDSAT at the state level for each round of the IBBA. We also checked and verified the equilibrium criteria for the key variables using RDSAT 5.6. The individual weights are calculated by the RDSAT; they are proportional to the inverse of the respondent's degree (their network size) and RDSAT generates the weighted estimates by default (Heckathorn, 2007; Schonlau & Liebau, 2012).

SPSS Version 15.01 (IBM®, New York) was used to run logistic regression models to measure the association between the outcome and explanatory variables. Weight of the dependent variable was calculated using RDSAT and applied to carry out weighted analysis (Volz et al., 2007). The models were built in the following sequence: (1) unadjusted associations between the exposure and the outcomes; and (2) multivariate models adjusted for age, district of data collection, education, marital status, frequency of injection in the past one month, duration of injecting, and round of the IBBA. The first set of logistic regression models estimated the association between safe injection practices, consistent condom use, and biological variables (HIV, syphilis, Chlamydia, HBV, and HCV) as outcomes and the round of IBBA data collection as the primary explanatory variable (Table 3). For these analyses, both the rounds were combined into a single dataset and the reference for each estimate was Round 1 of the IBBA. NG could not be used as an outcome measure for the logistic regression models as the weights for NG could not be calculated due to the limitations of the RDSAT software. The next set of logistic models estimated the association between behavioural variables (self-reported injection practices, self-reported condom use, and HIV testing) and composite exposure to the Avahan intervention programmes as explanatory variable; these were analyzed separately for Rounds 1 and 2 of IBBA (Table 4). We compared the odds ratios in these two Rounds of the IBBA using the methods described by Altman and Bland (2003).

Results

We have presented the results separately for Manipur and Nagaland.

(A) Manipur

Programme coverage data

CMIS data indicate that about 9% of the target PWID population in Manipur (estimated to be 9600 in the Avahan catchment area in two districts) were registered in the Avahan intervention by January 2005; this proportion increased to more than 80% by September 2006 and remained so till March 2010. Less than 1% of the PWID had ever visited the clinic by March 2005; however, this proportion increased to about 58% by March 2010. About 77% of the PWIDs were contacted by the peer educators/outreach workers every month and about 18% of the PWIDs visited the clinic every month by March 2010 (Fig. 2a). The ratio of peer educators to the number of PWIDs was 1:93 in June 2005; this ratio changed to 1:52 by June 2008 which is close to Avahan target of 1:50 (Fig. 2b) (Verma et al., 2010). About two free needles and syringes (free of cost) were distributed per PWID/per month in June 2005 which increased to 17 per PWID/per month by March 2010. The return rate of needle and syringes remained at 60–70% throughout.

The IBBA data also reflect this increase in the access to services. About 47% of the PWIDs reported visits to clinics in Round 1 of the IBBA; this proportion increased to 71% by Round 2 ($p < 0.001$). There was a statistically significant increase in being contacted by the Avahan peer educator in the Round 2 compared with Round 1 (54% vs 47%, $p = 0.01$) (Table 2).

Socio-demographic data

About 38% of PWIDs were in the age group of 21–25 years in Round 1, whereas a high proportion of the PWIDs (36%) were more than 31 years of age in Round 2 in Manipur. In general the proportion of literate PWIDs was high in both the states and did not differ significantly in both rounds of the IBBA (Table 2). Even though most of the PWIDs were not married in both Rounds, the proportion of currently married PWIDs was significantly higher in Round 2 compared with Round 1 (36% vs 26%, $p < 0.001$). Select demographic characteristics of the PWIDs in Rounds 1 and 2 have been described in Table 2.

Behavioural and biological data

Drug-injecting behaviours. The proportion of daily injectors was significantly higher in Round 2 compared with Round 1 (57% vs 48%, $p = 0.01$). Similarly, the proportion of PWIDs who reported injecting drugs for more than 5 years was significantly higher in Round 2 compared with Round 1 (48% vs 25%, $p < 0.001$) (Table 2). However, PWIDs in Round 2 were more likely to report 'consistent safe injection practice in the last six months' (adjusted odds ratio [aOR] 1.88, 95% confidence intervals [CI]: 1.46–2.43) and 'safe injection during the last injection' (aOR: 3.83, 95% CI: 2.48–5.92). Similarly PWIDs in Round 2 were more likely to use condom during the last sex act with a female sex worker (aOR: 8.47, 95% CI: 2.28–31.43). We found that odds of drawing drugs from the same container during the last episode of drug use among PWIDs who were exposed to the Avahan intervention was significantly lower in Round 2 compared with Round 1 (Round 2: aOR: 0.45, 95% CI: 0.33–0.62 vs Round 1: aOR: 1.61, 95% CI: 1.20–2.15; $p < 0.01$), however there were no significant difference in needle/syringe sharing behaviours (Table 4).

Condom use and other behaviours. PWIDs in Round 2 were more likely to report consistent condom with a regular female partner compared with Round 1 (aOR: 1.57, 95% CI: 1.11–2.23) (Table 3). PWIDs exposed to Avahan interventions were more likely to use condoms with regular female partners in Round 2 of the IBBA compared with Round 1 (Table 4). A higher proportion of PWIDs in our sample reported having undergone HIV testing in Round 2 compared with Round 1 (38% vs 15%, $p < 0.001$), and those exposed to the Avahan interventions were more likely to have had an HIV test in both Rounds 1 and 2 compared with those not exposed to Avahan interventions (Table 4).

STIs and blood-borne infections. The change in serological outcomes did not follow a consistent pattern between the two rounds of the

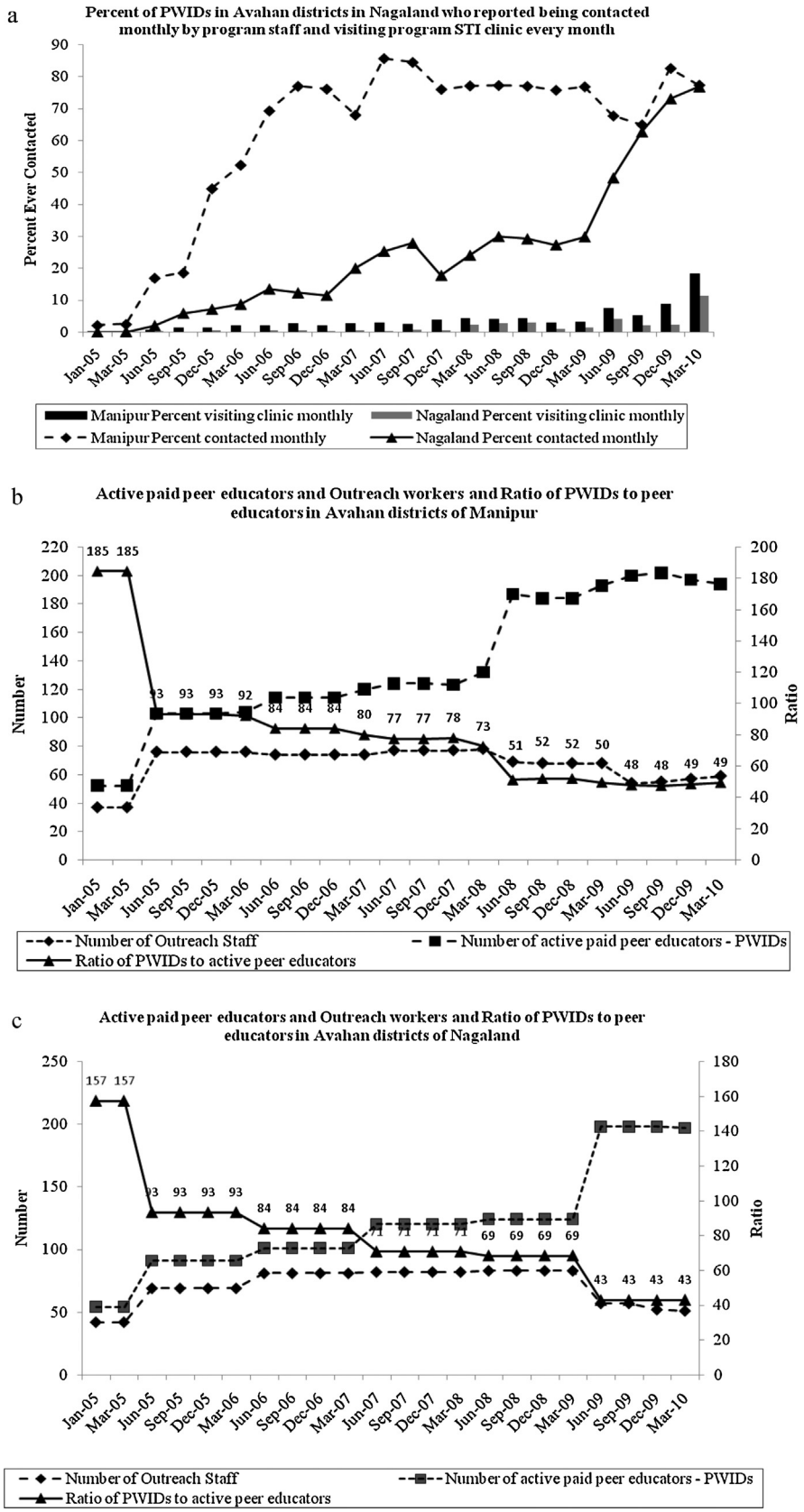

Fig. 2. (a–c) Figures showing the scale and extent of coverage of different components of the Avahan programme for People Who Inject Drugs (PWIDs) in Manipur and Nagaland (2005–2010), India.

Table 2
Descriptive statistics (demographics, injecting behaviours, condom use, exposure to the programme, and STIs including HIV) of among People Who Inject Drugs (PWIDs) in Manipur and Nagaland, India.

Background characteristics	Manipur			Nagaland		
	IBBA Round 1 (95%, CI)	IBBA Round 2 (95%, CI)	*p*-Value	IBBA Round 1 (95%, CI)	IBBA Round 2 (95%, CI)	*p*-Value
Demographic variables						
Age						
18–20	14.5 (11.5–17.5)	4.0 (2.5–5.5)	<0.001	36.4 (32.0–40.7)	18.0 (14.4–20.8)	<0.001
21–25	38.1 (34.2–42.1)	26.0 (22.5–29.7)	<0.001	34.1 (31–38.0)	34.8 (31.5–38.9)	0.94
26–30	25.2 (21.9–28.8)	34.1 (30.6–37.4)	<0.001	22.2 (19.4–25.5)	26.7 (23.5–38.9)	0.21
31–highest	22.2 (18.8–25.7)	35.9 (32.4–39.8)	<0.001	6.8 (4.9–8.7)	20.5 (17.6–23.6)	<0.001
Education						
Literate	94.3 (92.3–95.7)	91.8 (89.7–93.4)	0.07	87.1 (84.8–89.5)	88.1 (85.9–90.3)	0.54
Marital status						
Never married	69.0 (65.4–72.2)	51.8 (47.6–55.7)	<0.001	83.3 (80.5–86.0)	66.4 (62.8–69.6)	<0.001
Currently married	25.8 (22.0–29.0)	35.6 (32.2–39.7)	<0.001	15.1 (12.4–17.6)	27.6 (24.5–31.1)	<0.001
Divorced/widowed/separated	5.2 (4.0–7.0)	12.5 (10.1–15.0)	<0.001	1.6 (0.9–2.5)	6.1 (4.4–7.6)	<0.001
Injection practices						
Duration of injecting drugs						
Below 1 years	19.1 (15.3–23.3)	6.3 (4.5–8.6)	<0.001	30.2 (26.0–34.5)	9.9 (7.5–11.6)	<0.001
1–3 years	37.9 (34.7–41.6)	27.7 (23.8–31.3)	<0.001	37.9 (34.7–41.6)	61.3 (57.8–65.1)	<0.001
3–5 years	17.7 (15.1–20.4)	18.5 (15.7–21.3)	0.69	12.6 (10.7–14.9)	16.3 (13.8–18.7)	0.02
5+ years	25.3 (21.7–28.6)	47.6 (43.8–51.4)	<0.001	21.2 (17.9–24.0)	12.5 (10.3–15.1)	<0.001
Duration of drug use (oral/injecting)						
Below 1 years	6.9 (4.6–8.8)	2.9 (1.6–4.8)	<0.001	14.2 (11.1–17.2)	3.4 (2.2–4.8)	<0.001
1–3 years	30.0 (26.8–34.1)	18.4 (15.4–21.9)	0.040	23.6 (20.4–26.9)	30.4 (26.6–33.8)	0.01
3–5 years	20.9 (17.5–23.6)	16.5 (13.5–18.9)	<0.001	15.5 (13.3–18.2)	25.8 (23.5–29.2)	<0.001
5+ years	42.2 (38.5–46.6)	62.2 (58.4–66.0)	<0.001	46.8 (42.0–51.2)	40.4 (36.7–44.3)	0.03
Daily injectors	48.3 (43.8–53.0)	57.3 (51.8–62.6)	0.01	41.1 (37.3–45.7)	21.7 (18.8–25.1)	<0.001
Safe injecting (last time)	90.3 (88.1–92.3)	96.3 (95.06–97.63)[†]	–	80.2 (76.8–83.1)	80.82 (78.1–83.5)[†]	–
Safe injecting (consistent)	34.6 (30.3–38.3)	36.3 (32.2–40.1)	0.56	29.7 (25.8–33.3)	49.5 (45.9–53.0)	<0.001
Condom use						
Last time condom use with FSWs	81.4 (73.5–100.0)[a]	94.29 (90.39–98.18)[b]	–	57.14 (37.60–76.68)[c]	67.35 (53.7–80.9)[d]	–
Consistent condom use with FSWs	42.6 (33.8–71.1)[a]	31.0 (11.9–65.7)[b]	0.50	17.86 (02.73–32.98)[c]	28.57 (15.5–41.7)[d]	–
Last time condom use with regular female partner	32.3 (21.8–40.6)	45.8 (40.0–53.7)	0.47	36.5 (32.7–41.7)	46.2 (39.1–50.6)	0.01
Consistent condom use with regular female partner	2.4 (0.3–4.2)	7.0 (3.6–10.8)	0.14	4.3 (1.6–4.6)	13.1 (8.6–14.2)	<0.001
Undergone HIV testing voluntary	15.6 (12.8–18.1)	38.2 (34.3–41.7)	<0.001	3.9 (2.7–4.8)	15.0 (12.6–17.9)	<0.001
Exposure of intervention						
Contacted by PE/OW	46.7 (42.7–50.3)	54.2 (50.8–58.7)	0.01	21.8 (18.5–24.8)	43.1 (37.9–48.1)	<0.001
Visited clinics	46.5 (41.7–50.3)	70.7 (66.6–74.4)	<0.001	20.7 (17.6–23.7)	40.4 (34.7–46.1)	<0.001
Received needle/syringe	54.9 (50.1–60.1)	60.2 (56.4–64.3)	0.11	18.5 (15.4–21.1)	42.1 (37.1–47.1)	<0.001
Exposed to any of the three services	64.4 (60.2–69.0)	79.8 (74.9–82.7)	<0.001	30.1 (26.4–33.8)	49.1 (43.2–54.6)	<0.001
Biological variables						
HIV-1 infection	27.8 (24.3–31.4)	29.2 (25.7–33.0)	0.59	1.4 (0.4–2.6)	1.6 (0.7–2.7)	0.82
Syphilis – reactive[††]	4.0 (2.6–5.6)	3.3 (2.2–4.4)	0.05	12.0 (9.9–14.2)	14.8 (12.2–17.4)	0.10
Urethral gonorrhoea	0.2 (0.0–0.3)	0.4 (0.0–0.5)	–	1.0 (0.3–1.7)	1.6 (0.7–2.6)	0.40
Urethral chlamydia	1.9 (1.1–2.7)	1.5 (0.7–2.4)	0.54	10.9 (8.6–13.2)	8.8 (6.8–10.7)	0.18
Hepatitis B reactive	6.1 (4.5–7.9)	10.7 (8.8–13.3)	<0.001	5.6 (4.2–7.3)	8.1 (6.2–9.9)	0.05
Hepatitis C reactive	67.3 (63.0–72.0)	69.9 (65.5–74.2)	0.42	14.7 (11.6–17.2)	15.1 (12.3–17.8)	0.85

[a,b,c,d] Base are 80, 140, 29 and 49.
[†] Analysis done by SPSS.
[††] Any person with a Reactive Plasma Reagent (RPR) and *Treponema pallidum* haemagglutination assay (TPHA).

IBBA. While, the syphilis prevalence declined significantly in Round 2 compared with Round 1 (3% vs 4%, $p = 0.05$), the prevalence of HBV increased in Round 2 compared with Round 1 (11% vs 6%, $p < 0.001$). There was no significant difference in other serological outcomes (Table 2). The prevalence of HIV in both rounds of IBBA was high and did not show any significant differences (27.8% in Round 1 vs 29.2% in Round 2, $p = 0.59$) (Table 2). However, after adjusting for demographics and injection practices, we found that PWIDs in Round 2 of the IBBA were significantly less likely to be HIV infected compared with Round 1 (aOR: 0.48, 95% CI: 0.37–0.63; $p < 0.01$) (Table 3).

(B) Nagaland

Programme coverage data

CMIS data showed that about 19% of the target PWIDs in Nagaland (of the estimated denominator 8500 in the Avahan catchment in two districts) had registered with the intervention in January 2005; this proportion increased to more than 80% by September 2009. We also found that less than 1% of PWIDs had ever visited an Avahan clinic in March 2005; however, this proportion had increased to 27% by March 2010. The proportion of PWIDs visiting the clinic monthly, however, remained low at 11% in March 2010 (Fig. 2a). The ratio of active peer educator to number of PWIDs was 1:93 in June 2005 and reached to 1:43 by June 2009 and remained same till March 2010 (Fig. 2c). About two free needles and syringes were distributed per PWID/per month in June 2005 which increased to 11 per PWID/per month by March 2010.

A significantly higher proportion of PWIDs reported having been contacted by a peer educator/outreach worker, having visited Avahan clinics, or having received needles and syringes in Round 2 compared with Round 1 in Nagaland (49% vs 30%, $p < 0.001$) (Table 2).

Table 3
Association between behavioural and biological outcomes, and two rounds of the IBBA among People Who Inject Drugs (PWIDs) in Manipur and Nagaland, India.[a,b]

	Manipur, odds ratios (95% confidence intervals)		Nagaland, odds ratios (95% confidence intervals)	
	Unadjusted	Adjusted[c]	Unadjusted	Adjusted[c]
Injection practices				
Consistent safe injection	1.07 (0.88, 1.32)	1.88 (1.46, 2.43)**	2.37 (1.94, 2.90)**	2.35 (1.86, 2.80)**
Safe injection last time[†]	3.69 (2.42, 5.61)**	3.83 (2.48, 5.92)**	1.05 (0.83, 1.34)	1.04 (0.80, 1.37)
Condom use with the regular female partner				
Consistent condom use	1.77 (1.30, 2.42)**	1.57 (1.11, 2.23)**	1.58 (1.24, 2.01)**	2.09 (1.57, 2.80)**
Condom used last time	1.41 (1.03, 1.93)*	7.81 (0.75, 81.31)	2.40 (1.56, 3.71)**	3.38 (2.08, 5.52)**
Condom use with female sex workers				
Consistent condom use	0.80 (0.61,1.04)	1.76 (0.78, 3.97)	0.32 (0.19, 0.55)**	1.87 (0.41, 8.53)
Condom used last time	8.17 (5.34, 12.48)**	8.47 (2.28, 31.43)**	1.75 (1.10, 2.78)**	2.23 (0.54, 9.17)
Biological outcomes				
HIV-1 infection	1.06 (0.86,1.32)	0.48 (0.37, 0.63)**	1.27 (0.57, 2.85)	0.88 (0.35, 2.29)
Syphilis[††]	0.82 (0.49,1.37)	1.77 (0.80, 3.92)	1.36 (1.03, 1.82)*	1.29 (0.937, 1.798)
Urethral chlamydia	0.77 (0.36,1.66)	0.78 (0.35, 1.74)	0.81 (0.60, 1.13)	0.83 (0.580, 1.198)
Hepatitis B	1.83 (1.29, 2.63)**	1.74 (1.16, 2.62)**	1.42 (0.98, 2.09)	1.05 (0.685, 1.610)
Hepatitis C	1.12 (0.92, 1.39)	0.80 (0.60, 1.08)	0.99 (0.76, 1.30)	0.70 (0.518, 0.953)

[a] The estimates shown here are weighted estimates (based on weight calculated by RDSAT for the dependent variable).
[b] The reference for each of the estimate is Round 1 of the IBBA. Thus, for consistent safe injection in the last six months the interpretation will be as follows: In Manipur, after adjusting, subjects in Round 2 of IBBA were significantly more likely to report consistent safe injection compared with those in Round 1 of IBBA (aOR: 1.88, 95% CI: 1.46, 2.43).
[c] The models were adjusted for age, district of data collection, education, marital status, frequency of injection past month, duration of injection.
[†] Analysis on SPSS without using RDS weight.
[††] Any person reactive on RPR and TPHA.
* $p < 0.05$.
** $p < 0.01$.

Socio-demographics

About 36% of the PWIDs were between the ages of 18 and 20 years in Round 1 in Nagaland; however, the proportion in this age range had significantly reduced to 18% in Round 2 ($p < 0.001$). The proportion of literate PWIDs was high and similar in both rounds of the IBBA in Nagaland. There was a significant increase in the proportion of PWIDs who were more than 31 years of age in Round 2 compared with Round 1 (Table 2). The proportion of never married and married PWIDs increased in Round 2 compared with Round 1 (Table 2). Select demographic characteristics of PWIDs in Nagaland are described in Table 2.

Behavioural and biological data

Drug injecting behaviours. The proportion of daily injectors reduced significantly in Round 2 compared with Round 1 (22% vs 41%, $p < 0.001$). A lower proportion of PWIDs reported that they had injected drugs for more than five years in Round 2 compared with Round 1 (13% vs 21%, $p < 0.001$) (Table 2). Moreover, PWIDs were more likely to report 'consistent safe injection practices' in Round 2 compared with Round 1 (aOR: 2.35, 95% CI: 1.86–2.80), even though there was no significant difference in the safe injection practice during "last time" use (Table 3). In general, PWIDs who were exposed to various components of the Avahan intervention were less likely to report unsafe injection practices (Table 4).

Condom use and other behaviours. PWIDs were more likely to report consistent condom use with a regular female partner (aOR: 2.09, 95% CI: 1.57–2.80) and condom use during the last sex act with a regular female partner (aOR: 3.38, 95% CI: 2.08–5.52) in Round 2 compared with Round 1. We also found that PWIDs exposed to the Avahan intervention were significantly more likely to report condom use during the last sex act with a regular female partner in Round 2 compared with Round 1 (Table 4). Exposure to Avahan intervention was associated with a higher condom use with regular female partners and FSWs in both rounds of the IBBA (though in some cases the association was not statistically significant) (Table 4). Furthermore, PWIDs exposed to the Avahan intervention were significantly more likely to have undergone an HIV test in Round 2 compared with Round 1 (Table 4).

STIs and blood borne infections. The proportions of STIs in both rounds of the IBBA varied and were not significantly different between the two rounds for most of the STIs (Table 2). The proportion of HBV was significantly higher in Round 2 compared with Round 1 (8% vs 6%, $p = 0.05$). However, after adjusting for demographic factors and injection practices, we found no significant differences between two rounds of IBBA in the likelihood of being HBV positive (Table 3). The HIV prevalence was stable across both rounds of the IBBA (1.2% in Round 1 and 1.6% in Round 2, $p = 0.82$) (Table 2).

Discussion

The present assessment, using multiple data sources, provides information on the Avahan intervention among PWIDs in Manipur and Nagaland. The Avahan intervention was able to provide services to the targeted 80% of the estimated PWID population in its catchment area in both these states. There was a concomitant improvement in access to services; during the course of the intervention, the proportion of PWIDs accessing the clinic increased in both Manipur and Nagaland. The intervention had distributed free needles and syringes in these states, and safe injecting practices (such as never sharing needles/syringes) increased in these states. Simultaneously, a higher proportion of PWIDs reported consistent condom use with their regular female partners as well as FSWs in Round 2. However, the HIV prevalence remained stable in both states; and changes in the prevalence of STIs and blood borne viral infections over time does not show any consistent pattern.

An important achievement of the Avahan intervention was the scale-up of services for targeted population of PWIDs in both these states. Indeed, according to the technical guide by the World Health Organisation, UNDOC, and UNAIDS (2009), this intervention achieved a high target as far as coverage for PWIDs is concerned; it could reach more than 60% of the estimated PWID population

Table 4
Association between behaviours (injecting behaviours, condom use, and voluntary HIV testing) and exposure to various components of the Avahan intervention in Rounds 1 and 2 of the IBBA among People Who Inject drugs Users (PWIDs) in Manipur and Nagaland, India.[a]

	Manipur			Nagaland		
	Adjusted OR[b] (95% CI)		*p*-Value[†]	Adjusted OR[b] (95% CI)		*p*-Value[†]
	IBBA Round 1	IBBA Round 2		IBBA Round 1	IBBA Round 2	
Reported needle sharing behaviours						
Shared needle/syringe at last injection	0.74 (0.53–1.04)	0.99 (0.51–1.91)	0.44	0.64 (0.43–0.94)*	0.58 (0.41–0.82)**	0.71
Shared needle/syringe during past month	0.63 (0.46–0.87) **	0.95 (0.65–1.39)	0.10	0.57 (0.37–0.85)**	0.53 (0.38–0.76)**	0.79
Used drugs drawn from common container at last injection	1.61 (1.20–2.15)**	0.45 (0.33–0.62)***	<0.01	0.58 (0.40–0.86)**	0.96 (0.71–1.29)	0.04
Reported condom use behaviours						
Condom used during last sex – regular partner[c]	1.17 (0.70–1.95)	1.71* (1.10–2.67)	0.27	1.27 (0.80–2.02)	2.36 (1.63–3.41)***	0.04
Consistent condom use – regular partner[c]	0.70 (0.16–3.02)	2.86* (1.03–7.92)	0.12	1.34 (0.48–3.78)	1.17 (0.70–1.97)	0.82
Condom used during last sex – female sex worker[d]	1.06 (0.56–1.98)	0.34 (0.05–2.45)	0.28	1.56 (0.73–3.32)	27.1** (2.44–301.26)	0.03
Consistent condom use – female sex worker[d]	1.96 (0.36–10.42)	0.48* (0.24–0.99)	0.13	–††	4.37 (0.81–23.60)	–
Other behaviours						
Ever had a voluntary HIV test	2.63 (1.88–3.69)***	2.26 (1.68–3.04)***	0.51	1.82 (1.02–3.24)*	4.32 (2.99–6.24)***	0.01

Note: Program exposure is defined as; contact with peer educator, having received needles/syringes, AND having visited the clinic/drop-in centre.

[a] The reference for each of the estimate is not being exposed to that particular component of the programme. Thus, for shared needles/syringes at the last injection it will be as follows: in Manipur, subjects who were exposed to Avahan intervention in Round 1 of IBBA were significantly less likely to report sharing needle/syringe at the last injection compared with those unexposed (adjusted OR: 0.74, 95% CI: 0.53–1.04).

[b] Odds ratios were adjusted for age, literacy, duration of injecting, and frequency of injecting during the previous month.

[c] Analysis based on a subset of PWIDs; Round 1: 312 Manipur, 584 in Nagaland, Round 2: 388 in Manipur, 586 in Nagaland. Only participants who responded as having a regular partner were included in these analyses.

[d] Analysis based on a subset of PWIDs; Round 1: 80 in Manipur, 28 in Nagaland, Round 2: 140 in Manipur, 49 in Nagaland. Only participants who responded as having female sex workers as a sex partner were included in these analyses.

[†] The *p* value indicates the difference in ORs between two rounds of IBBA.

[††] Could not calculate due to small sample size.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

in both these states. Furthermore, the programme also successfully achieved a high target for distribution of free needles and syringes to PWIDs in both these states. As seen in our assessment, by steadily increasing the number of peer educators, and distributing free needles and syringes, Avahan was able to improve safe injecting practices by PWIDs in these two states (particularly in Nagaland) even in the existing difficult socio-political environment (Chasie & Hazarika, 2009; Shimray, 2004). This achievement was due to intensive intervention combined with community based initiatives, such as mobilizing community to become members of self-help group or collectives. Thus, such an approach should be an important component of HIV prevention in National HIV prevention programmes (Armstrong, Kermode, Sharma, Langkham, & Crofts, 2010; Kumar et al., 2009). Large scale HIV prevention interventions by other programmes (such as Project ORCHID) in Manipur and Nagaland have also increased safe behavioural practices such as reduced needle sharing and increased condom use (Armstrong et al., 2010).

Some of the potential reasons for unsafe injecting practices are: intermittent supply of needles and syringes by the intervention programmes; structural issues such as unstable political environment; harassment by law enforcement authorities; or low levels of interest in the outreach workers (Chakrapani, Newman, Shunmugam, & Dubrow, 2011; Hangzo et al., 1997; Medhi et al., 2011). Additionally, interventions in the US and China (Fuller et al., 2007; Hammett et al., 2006; Rudolph et al., 2010; Wu et al., 2007) have used pharmacies and social marketing of injections to reduce the injection risk behaviours among PWIDs; these could be potential interventions along with community based interventions for risk reduction among PWIDs in India.

An important aspect of developing interventions for PWIDs is to address dual risk behaviours for HIV extending beyond needle/syringe sharing to look at unprotected sex with various sexual partners (Des Jarlais & Semaan, 2008; Eicher, Crofts, Benjamin, Deutschmann, & Rodger, 2000). Indeed, interventions with PWIDs have not only resulted in safe injection practices but also safe sex practices (Coyle, Needle, & Normand, 1998; Rotheram-Borus, Rhodes, Desmond, & Weiss, 2010). In India, Panda et al. (2007) have highlighted the importance of unsafe sex practices as a route of transmission of STIs including HIV to PWIDs and their partners. Solomon et al. (2011) found that the HIV prevalence among a sample of PWIDs spousal partners in Chennai was 10 times more than the prevalence in women attending the antenatal clinics. Thus, safe sex practices are important not only to reduce the risk of acquisition of STIs and HIV among the male PWIDs but also to reduce the risk of transmission to their regular partners. We found that consistent condom use with regular female partners and FSWs increased from 2006 to 2009. Furthermore, PWIDs who were exposed to components of the Avahan intervention were, in general, more likely to use condoms with both regular female partners and FSWs (even though some of the associations were not statistically significant). Thus, in these two states, in which the Avahan intervention was initiated, there was a reduction in multiple risk behaviours – unsafe injecting practices and unsafe sexual behaviour. Even though, opioid substitution therapy (OST) has been implemented by various international funders and subsequently the government in North-east of India (Armstrong et al., 2010; Kumar et al., 2009), it was not a part of the Avahan intervention. It has been demonstrated that OST reduces high risk behaviours, particularly injection practices, and HIV cases among PWIDs and has also been suggested by UNAIDS, UNODC and the WHO as an intervention strategy (Gowing, Farrell, Bornemann, Sullivan, & Ali, 2008; World Health Organisation, et al., 2009). Thus, potentially, addition of this intervention component may have increased safe behaviours in our population. Another important intervention is the use of pre-exposure prophylaxis (PreP) among PWIDs. In fact, Alistar, Owens, and Brandeau (2014) reported that PreP can be an additional important intervention strategy. They have also found

that it to be a cost-effective intervention, particularly in regions in which the main driver of epidemic is by injection drug use. However, pre exposure prophylaxis has still not been included in the intervention strategies in India.

The biological outcomes showed a mixed picture in our assessment, and it also differed across both the states. For instance, in Manipur the adjusted prevalence of HIV reduced in Round 2 whereas the prevalence of Hepatitis B increased. There were no significant differences in the prevalence of other STIs across both rounds of the IBBA in Manipur. In Nagaland, there were no significant differences in any of the infections between the two rounds of the IBBA. The HIV prevalence was relatively high in Manipur whereas it was lower in Nagaland; these findings are similar to those reported by other authors (Mahanta et al., 2008; National AIDS Control Organisation, 2012). According to the 2010–2011 estimates based on sentinel surveillance, NACO reported that the HIV prevalence showed a declining trend in both Manipur and Nagaland (National AIDS Control Organisation, 2012). Interestingly, in these data the estimated HIV prevalence was lower in Manipur (12.9%) compared with both rounds of the IBBA survey, whereas the estimated HIV prevalence was higher in Nagaland (2.21%) compared with the IBBA survey. However, it should be noted that IBBA estimates are based on data from only two districts in both the states and used a different methodology; we used RDS for sampling the population for IBBA whereas surveillance data used facility based testing. We did find that the HIV prevalence in Manipur was slightly higher in Round 2 compared with Round 1 (29.2% vs 27.8%). However, after adjusting for age in the multivariate models, the odds of being HIV infected was lower in Round 2 (aOR: 0.48, 95% CI: 0.37–0.63). Thus, potentially, the high HIV prevalence was due to the different age structures in both rounds of the IBBA in Manipur (a higher proportion of PWIDs were more than 31 years of age in Round 2 compared with Round 1). HBV and HCV, the other important infections transmitted by contaminated blood, also had a relatively high prevalence in Manipur compared with Nagaland. Mahanta et al. (2009) found that PWIDs in Nagaland also had a lower prevalence of these three infections compared with those in other north east states.

Armstrong et al. (2010) have highlighted the potential differences between the PWIDs in Manipur and Nagaland. According to them the reasons for these differences are the drug use patterns and the maturity of the AIDS epidemic (Armstrong et al., 2010). For instance, the most common drug used in Nagaland is spasmoproxyvon, which may also be used orally (Armstrong et al., 2010). Furthermore, Kermode et al. (2007) found that a majority of the PWIDs used heroin for 'first time injection' in Manipur compared with Nagaland (48% vs 13%), whereas a majority of the PWIDs used spasmoproxyvon for 'first time injection' in Nagaland compared with Manipur (82% vs 49%). In addition to these differences in drug use patterns, Armstrong et al. (2010) suggest that due to the mature epidemic in Manipur, the response is equally effective; they highlight the fact that the HIV prevalence in Manipur has reduced from 80% in late nineties to 12% in 2007. Finally, Mahanta et al. (2008) reported that PWIDs in Nagaland were more sexually active compared with those in Manipur. It is quite likely that the HIV epidemic in Nagaland may be more due to sexual transmission rather than injection drug use. In any case, PWIDs in both these states have a high prevalence of all three infections – HIV, HBV, and HCV. Thus, they should be the focus of HIV prevention and needle exchange programmes.

It should be noted that the impact of intervention on chronic infections such as HIV, HBV, and HCV can be better assessed using incidence data. The prevalence may reflect cumulative prevalence and in a short duration (of 3 years) a real decline in the prevalence may not be visible. However, age-adjusted estimate of HIV prevalence shows a decline in Manipur in the second round that may indicate influence of intervention. Furthermore, although, there is decline in high risk behaviours (injecting and sexual) in Round 2 in both states, a large proportion of PWIDs still continues to engage in high risk behaviours; therefore incidence of these infections (particularly STIs) may still be high. Finally, we can't underestimate the infection acquired through unsafe sex among PWIDs.

This assessment is not without its limitations. The Avahan implementation and evaluation design did not include any control groups; thus it was not an 'intervention-control two group' design. Rather, it was a pre–post assessment. Ethically, it was felt by the programme designers that they could not withhold known HIV prevention services to the PWIDs and could not have any control groups. Hence, a design that was feasible and appropriate for assessment for large scale public-health programmes was used (Habicht, Victora, & Vaughan, 1999). It has been recommended that in such a scenario, where multiple interventions are aiming to reach vulnerable populations, evaluation designs using different sources of evidence may be used as an alternative to randomized controlled trials (Bennett, Boerma, & Brugha, 2006; Bryce & Victora, 2005; Craig et al., 2008; Pettifor, MacPhail, Bertozzi, & Rees, 2007; Victora, Black, Boerma, & Bryce, 2011). In our evaluation, multiple sources of data helped triangulate our findings. It is quite likely that some of the responses – particularly safe injection practices and condom use – may be influenced by social desirability bias and we may have overestimated these outcomes. It should be noted that the impact of intervention on chronic infections such as HIV, HBV, and HCV should ideally be assessed using incidence data (such as those collected by cohort studies). Finally, IBBA data were collected only among male PWIDs in four specific districts in the two states; hence these findings may not be generalizable to all the PWIDs in Manipur and Nagaland. We recruited only male PWIDs for IBBA since earlier estimates showed that there were few female PWIDs and we did not have size estimates for the population. Furthermore, intervention with female PWIDs was not an Avahan mandate.

In spite of these limitations, this assessment is an important contribution to HIV prevention literature on PWIDs in India. It is one of the few assessments of a large-scale HIV intervention on PWIDs in India. Furthermore, our analyses based on the Avahan evaluation design, present evidences along the program's logic model. We examined the coverage, outputs, and intermediate outcomes followed by associations with program exposure. These analyses were done using multiple data sources: program monitoring data and independent survey data. Thus, these data provide evidence for program effectiveness based on the congruency of findings in these data sources (Habicht et al., 1999).

In conclusion, Avahan's intervention programme for PWIDs in Manipur and Nagaland met the 'high-target' goals for a scale-up of coverage of services in geographically and socio-politically challenging locations in North-east India. Some of the important achievements of the Avahan intervention include: need based distribution of needles and syringes in these areas, increase in reported safe injection practices, increase in reported consistent condom use, and stabilization of HIV epidemic in these districts. Challenges, however, remain about high HIV, HBV, and HCV prevalence among these PWIDs in Manipur and Nagaland. Even though there is a decline, the prevalence of high risk behaviours is high and remains a concern. The high prevalence of STIs, particularly in Nagaland, highlights the need to focus on sexual transmission of infections among PWIDs and their sexual partners. Thus, there is a need to maintain the intensity of such targeted public health interventions (such as outreach services, counselling services for HIV and STI prevention, care, and treatment, provision of free new needle/syringe, abscess management, clinic services for treating of sexually transmitted infections, condom promotion and distribution and empowering the community) – with addition of other components such as OST and effective care of HIV infected PWIDs – to ensure high clinic

attendance, needle exchange programmes to promote safe needle and syringe use, and long term reduction of HIV and STIs in this population in India.

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Conflict of interest statement

None declared.

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