

# Impact of Intervention Program on Sexual Behavior, HIV and Sexually Transmitted Infections among Self-Identified Men Who Have Sex with Men in Select Districts of Andhra Pradesh, India

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## Abstract

The study aimed to assess the impact of Avahan intervention program on risk behaviors. Knowledge of HIV/STIs and their prevalence among self-identified men who have sex with men (MSM) in four select districts of Andhra Pradesh, India, covers about 1600 respondents in each of the two rounds. The response rates of MSM in R1 and R2 were about 70%. Higher numbers of MSM in R2 had literacy level of  $\geq 10$ th class, were either students, self-employed/business men and belonged to 20 - 24 years. Higher proportion of MSM in R2 reportedly had knowledge of HIV and its prevention, at least two signs/symptoms of STIs in men. Significantly higher numbers of MSM in R2 were exposed to programme interventions and consistent condom users. HIV prevalence declined significantly in one district, increased in one and remained similar in two districts. The prevalence of STIs decreased significantly in two districts, while remained similar in the other.

## Keywords

MSM, Risk Behavior, HIV-AIDS, STI, Condom Use

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## 1. Introduction

India, the second-most populous country, was experiencing a highly varied HIV epidemic, in the past two decades. HIV in India is concentrated among certain “high-risk” populations like Injecting Drug Users (IDUs), Men having Sex with Men (MSM) and Female Sex Workers (FSWs). Targeted interventions (TIs) with these populations have been one of the major aspects of India’s National AIDS Control Programme (NACP). The recent HIV estimates showed a reduction in Adult HIV prevalence from 0.41% in the year 2000, to 0.36% in 2006 and to 0.31% in 2009. The estimated number of new annual HIV infections declined from 0.27 m in 2000 to 0.12 m in 2009 [1].

However, Andhra Pradesh (AP) state remains to be critical in the spread and control of HIV epidemic, as it has second highest estimated adult HIV prevalence of 0.9%, with Manipur at 1.40%. While India had an estimated 2.4 m people living with HIV/AIDS in 2009, the state of AP tops the list with about 0.5 m; followed by 0.42 m in Maharashtra, 0.25 m in Karnataka and 0.15 m in Tamil Nadu. Of the estimated people living with HIV/AIDS, about 0.93 m (39%) is women [1].

HIV prevalence among Men having Sex with Men (MSM) in AP was high at 17.04% in 2007, with an increase from 10.25% in 2006. Sentinel surveillance data of 2007 also showed Andhra Pradesh as the only state with >1% prevalence among ANC attendees [2].

Targeted Interventions carried out by the Andhra Pradesh AIDS Control Society (APSACS) and *Avahan* by Bill and Melinda Gates Foundation (BMGF) are the two major HIV/AIDS prevention programs currently in operation in the state. The APSACS in partnership with NACO has been implementing HIV prevention, care and treatment programs since 1999, which have resulted in significant gains. However, the epidemic continues to be a cause for major concern. The HIV sentinel surveillance round in Andhra Pradesh during 2007 revealed that, across the state, the prevalence levels continue to show an upward trend, pointing to a need for intensified prevention efforts. There is an increasing recognition of the substantial role that MSM behaviors have played in HIV epidemics in Indian settings [3]-[13]. However, limited data are available in India on MSM except for some small studies [11] [14]-[19].

In this backdrop, the present paper utilizes the data from “Integrated Behavioral and Biological Assessment” (IBBA) conducted at two different time points, Round-1 in 2006-2007 and Round-2 in 2009 in select districts of Andhra Pradesh to analyze and present the impact of these Interventions on the sexual behaviours, STI prevalence and HIV prevalence in the state of Andhra Pradesh.

## 2. Methods

### Ethical Approval

#### Setting

The Integrated Biological and Behavioral Assessment (IBBA), was a cross-sectional study, conducted by adopting same protocol, questionnaires, Methodology, sampling design and sample size during Round-1 and Round-2 in the districts of East Godavari, Guntur, Hyderabad and Visakhapatnam. A sample size of 400 subjects per district per round was arrived to detect an absolute difference of 15% or more from an assumed value of 50% of consistent condom use (use of condom at every sex act) by the target population with 95% confidence, 90% power and design effect of 1.7.

A probability based sampling method with a varied sampling approach was used to select primary sampling units, the sites. Time Location Cluster Sampling approach was used taking into account the different sub-populations that congregate in a single location at different time points of a day or on different days of a week [20].

This study collated information on socio-demographic characteristics, sexual behaviors, risk perception, prevalence of STI and HIV among self-identified men who have sex with men (MSM) population.

The inclusion criteria were, any male or *hijra*, self-identified MSM, aged 18 years or above, who had any type of sex (oral, manual, or penetrative), paid or unpaid, with another male in the last one month.

The data collected was scrutinized, fed in to computer by double entry technique to rectify entry mistakes if any and was cleaned using range and consistency checks in order to develop database. Appropriate weights were calculated and applied at district levels for unequal selection probability. These weights were used for statistical analysis of all the parameters [20]. The distributions of data at different time points in the study districts were compared using Pearson  $\chi^2$ .

Sexual partners of MSM were categorized into 1) Paying male partners (having a partners who paid to have sex), 2) Paid male partners (Paid to have sex with partners), 3) Non-commercial, non-regular male partners 4) Regular male partners, 5) Regular female partners and 6) Paid female Partners. Consistent condom use was defined as using condom at every sex act; and last time condom use was defined as use of condom during the last sex act.

The study was approved by the Institutional ethical committee of National Institute of Nutrition. Written informed consent was obtained from the participants of the study, with a provision to maintain confidentiality.

Community monitoring board and Community advisory boards were established in each of the district with local NGOs, community members, local officials and leaders as members to communicate to the community about the study, to create an ambience of mutual trust, to help and ensure the protection of rights and physical & psychological well-being of the respondents.

### 3. Results

Response rate of the participants in the study ranged from a low 56% in Vishakapatnam to a high 70% in E. Godavari. Response rates were relatively less in R2 compared to R1 in all the districts, except E. Godavari where it was similar (data not shown).

#### 3.1. Profile of MSM

District wise profile of MSM population in both rounds of IBBA is presented in **Table 1**. Significantly higher proportion (70%) of young (20 - 29 years) MSM participated in R2 in E. Godavari district compared to R1, while in other three districts the age distributions of MSM were comparable in both rounds. The mean age was significantly lower in E. Godavari district in R2 (27.3 years) compared to 29.6 in R1, with no significant differences in other districts. In general, significantly ( $p < 0.01$ ) higher proportion of MSM had literacy level of 10<sup>th</sup> standard or above in R2, compared to R1. The proportion of students, self-employed/business and service class MSM was relatively higher in R2. Students' representation ranged from 6.3% to 14.3% in R2 across districts compared to 2.5% to 5.9% in R1.

Current marital status of MSM did not vary significantly between R1 and R2. Majority of MSM (ranging from 68% to 96%) in both the rounds across all districts reported that they were staying with their families.

A majority (93% to 100%) of the MSM who participated in both the IBBA rounds were localities (belonging to the place where study is done). Most of the MSM (about 70% - 90%) were staying with their families, both in R1 & R2. In the district of E. Godavari, the proportion of those staying with male sex partner was relatively higher in R2, compared to R1 (9% vs. 0.2%).

The proportion of those who had undergone circumcision remained low (1% - 4%) in the districts of E. Godavari and Visakhapatnam during both the rounds. While it continued to be high in Guntur (about 20%), significant ( $p < 0.01$ ) decline was observed in Hyderabad (from 19% to 8%).

A majority of the respondents (60% - 80%) reportedly had the sexual debut at the age of 15 - 19 years during both the rounds. The proportion of those who had sexual debut at the age < 15 years tended to decrease in all the districts.

#### 3.2. Types of Partners

Distribution (%) of MSM by the type of partners in different districts is presented in **Table 2**. The percent distributions of MSM according to type of main sexual partner between R1 and R2 were significantly different in all the districts except Guntur.

The proportion of MSM having only male as main sexual partner increased significantly ( $p < 0.01$ ) from R1 to R2 in E. Godavari (33% to 44%), Hyderabad (32% to 49%). While similar trend was observed in Guntur, it tended to decrease in the district of Visakhapatnam (53% to 36%). The proportion of MSM having female as a main sexual partner, was higher in R2 compared to R1 in the districts of E. Godavari and Visakhapatnam, while it declined in the districts of Guntur and Hyderabad. The proportion of MSM having both male & female as a main sexual partners, was lower in R2 compared to R1 in the districts of E. Godavari and Visakhapatnam, while it increased in the districts of Guntur and Hyderabad.

**Table 1.** Profile of MSM—by districts.

Particulars	East Godavari		Guntur		Hyderabad		Visakhapatnam	
	R1	R2	R1	R2	R1	R2	R1	R2
n	405	400	407	404	403	405	406	399
<b>Current Age (Years)</b>								
<20	6.7	1.6	4.7	4.0	6.1	4.3	13.7	10.1
20 - 24	27.7	36.3	41.6	28.1	33.9	43.1	39.3	40.9
25 - 29	25.3	37.0	21.1	26.7	27.6	28.3	25.4	22.3
30 - 34	14.3	12.4	13.5	20.7	13.1	11.8	11.0	8.1
35 - 39	10.5	5.6	9.6	8.3	9.7	9.2	4.9	9.3
40 - 44	5.3	3.5	6.0	6.2	5.2	2.3	2.2	3.8
≥45	10.1	3.6	3.3	6.0	4.1	1.0	3.5	5.3
p-Value	0.02		0.217		0.170		0.612	
Mean Age (Yrs)	29.6	27.3	27.3	28.9	27.8	26.2	25.5	27.0
Median Age (Yrs)	27.8	25.0	25.0	27.9	26.0	25.0	24.0	24.0
<b>Educational Status</b>								
Illiterate	21.5	12.8	34.9	21.1	21.4	13.9	16.4	25.8
1 <sup>st</sup> to 5 <sup>th</sup> Standard	15.5	7.8	14.3	7.7	14.3	2.5	16.3	6.3
6 <sup>th</sup> to 10 <sup>th</sup> Standard	44.8	36.7	38.5	37.1	43.3	42.5	54.9	42.1
Above 10 <sup>th</sup> Standard	18.3	42.6	12.3	34.1	21.0	41.1	12.3	25.8
p-value	0.002		0.000		0.000		0.000	
<b>Main Source of Income</b>								
Unemployed	9.6	1.2	1.1	0.6	5.5	0.4	13.4	2.1
Student	3.0	6.3	4.2	10.0	2.5	14.3	5.9	7.3
Self Employed/Business	25.0	29.1	12.6	31.3	9.0	20.2	19.8	24.2
Service	19.7	33.2	17.2	23.7	42.0	40.2	18.2	24.5
Labourer/Transport Workers	30.3	22.6	45.6	31.4	26.8	11.1	40.1	35.4
Massager/Pun	6.7	4.2	3.6	3.1	8.1	13.2	1.5	3.6
Others	5.5	3.5	15.5	0.0	6.1	0.7	1.1	2.9
p-Value	0.01		0.000		0.000		0.007	
<b>Current Marital Status</b>								
Never Married	52.8	59.1	38.2	47.2	70.4	73.3	61.2	73.0
Currently Married	46.4	40.7	60.0	51.7	26.8	26.7	38.5	26.2
Divorced/Widowed	0.6	0.2	1.4	1.2	2.3	0.1	0.3	0.8
Others	0.2	-	0.4	0.0	0.4	0.7	0.0	0.0
p-Value	0.42		0.222		0.045		0.104	
<b>Living Arrangement</b>								
Alone	10.6	3.2	3.1	6.0	23.3	10.7	4.1	3.1
With Family	88.3	79.9	93.4	92.9	67.6	77.6	95.4	96.3
With Friends/In Hostel	0.6	1.3	0.8	0.6	5.4	8.8	0.3	0.2
With Male Sex Partner	0.2	8.7	2.1	0.4	3.3	2.4	0.2	0.4
Others	0.3	6.9	0.6	0.0	0.4	0.5	0.0	0.0
p-Value	0.00		0.065		0.015		0.720	

## Continued

	Residential Status							
Localite	92.8	99.9	99.5	99.9	97.4	99.8	99.6	95.4
Non-Localite	7.2	0.1	0.5	0.1	2.6	0.2	0.4	4.6
p-Value	0.00		0.04		0.001		0.028	
	Circumcised							
No	95.6	97.7	80.0	81.9	81.3	91.9	98.8	96.5
Yes	4.4	2.3	20.0	18.1	18.7	8.1	1.2	3.5
p-Value	0.13		0.77		0.003		0.032	
	Age at Sexual Debut (Years)							
<15	7.0	5.1	16.8	10.9	33.1	20.7	17.4	9.2
15 - 19	71.6	80.5	74.2	70.2	57.6	64.6	78.0	80.1
20 - 24	20.0	12.5	8.1	17.8	8.5	13.8	4.4	10.5
≥25	1.4	1.8	1.0	1.1	0.9	0.8	0.2	0.2
p-Value	0.14		0.03		0.014		0.066	
Mean Age at First Sex (Yrs)	17.5	17.5	16.4	17.0	15.6	16.5	16.1	17.0
Median Age at First Sex (Yrs)	18.0	18.0	16.0	17.0	15.0	17.0	16.0	17.0

Table 2. Distribution (%) of MSM by type of partners—by districts.

Particulars	East Godavari		Guntur		Hyderabad		Visakhapatnam	
	R1	R2	R1	R2	R1	R2	R1	R2
Type of main sexual partners								
Only male partner	33.2	43.7	15.5	22.8	31.7	48.9	52.9	36.2
Only female partner	11.1	22.7	42.2	32.2	26.6	16.0	1.0	12.7
Both male and female partner	44.2	26.9	23.7	26.2	7.5	14.0	45.8	24.9
No main sexual partner	11.4	6.7	18.6	18.8	34.2	21.1	0.3	26.1
p-value	0.005		0.198		0.000		0.000	
Type of partners								
Have regular male partner	51.6	69.9	17.5	49.0	33.5	62.9	77.9	61.2
p-value	0.02		0.00		0.00		0.02	
Have regular hijra partner	36.8	0.7	63.3	0.0	32.4	0.0	21.8	0.0
p-value	0.00		0.00		0.00		0.00	
Have paying male partner	35.1	28.4	26.0	39.2	36.3	64.1	89.6	47.8
p-value	0.45		0.02		0.00		0.00	
Have paid male/hijra partner	48.0	17.7	46.2	6.0	46.2	13.4	31.4	44.9
p-value	0.001		0.00		0.00		0.03	
Have other non-paying male/hijra partners	88.6	95.4	87.5	97.0	88.8	93.6	95.4	92.6
p-value	0.01		0.001		0.06		0.30	
Have paid female partner	39.7	0.7	63.6	1.3	31.8	0.2	27.5	22.5
p-value	0.00		0.00		0.00		0.41	
Have regular female partner	55.3	49.5	65.9	58.4	34.1	30.0	46.8	37.6
p-value	0.42		0.18		0.37		0.15	
n	405	400	407	404	403	405	406	399

A majority (93% to 97%) of the MSM continued to have “other non-paying male/*hijra* partners” across the districts.

A significant ( $p < 0.05$ ) increase in the proportion of MSM having regular male partners and a significant ( $p < 0.01$ ) decline in the proportion of MSM having a regular *hijra* partner was observed in all the study districts.

A significant ( $p < 0.05$ ) increase in the proportion of MSM having paying male partners was seen in Guntur (26% to 39%) and Hyderabad (36% to 64%) districts over the period. A significantly ( $p < 0.05$ ) higher proportion (about 45%) of MSM in Visakhapatnam district reportedly had paid male/*hijra* partners in R2, compared to R1 (31%).

Less than 2% of MSM in all study districts except Visakhapatnam (about 23% - 28%) reportedly had paid female partners. The proportion of MSM having female regular partners remained essential similar (30% to 58%) between the rounds, across the districts.

### 3.3. Condom Use

Percent distribution of MSM by consistent condom use and condom use during last sex act with different types of partners is presented in **Table 3**.

The consistent condom use with regular male partners was relatively higher and increased significantly ( $p < 0.01$ ) in all the districts (from about 52% to 92%) over the period.

The data on consistent condom use with paying male partners was collected only in R2, which R2 ranged from 79% to 89% across districts. Consistent condom use with paid male/*hijra* partners increased significantly ( $p < 0.01$ ) 13% to 86% in E. Godavari; 40% to 98% on Guntur; 18% to 91% in Hyderabad and 1% to 95% in Visakhapatnam. Similarly, consistent condom use with non-paying male/*hijra* partners also increased significantly from 6% to 98% in E. Godavari; 32% to 75% on Guntur; 15% to 76% in Hyderabad and 1% to 90% in Visakhapatnam, over the period.

During R2, the consistent condom use and last time condom use with regular female partners was about 8% - 16% in Hyderabad, 13% - 14% in Guntur & E. Godavari and 32% in Visakhapatnam.

Use of lubricants during anal sex increased significantly ( $p < 0.01$ ) in Guntur (38% to 64%) and Hyderabad (34% to 71%) districts and decreased significantly in Visakhapatnam district (77% to 45%). Similar trend was observed with respect to E. Godavari district (41% - 59%). Proportion of MSM carrying condom at the time of interview was significantly higher in R2 (42% to 54%) compared to R1 (7% to 30%) in all the study districts except Visakhapatnam where it declined from 42% to 36%. Reported condom breakage during past one month remained similar over the period and ranged from 6% - 20% in all the districts, except in Visakhapatnam, wherein a significant decrease (17% to 6%) was reported. The proportion of MSM who reportedly had refused to have sex without condom with any male partner during the past 3 months increased significantly in R2 compared to R1 in all the districts except Visakhapatnam, wherein it decreased significantly (**Table 3**).

### 3.4. Knowledge of STIs & HIV/AIDS

Percent distributions of MSM according to Knowledge of STI and HIV/AIDS by districts are given in **Table 4**. A significantly ( $p < 0.01$ ) higher proportion of MSM in Guntur and Hyderabad districts during R2 reported having heard of STI among Men compared to R1. However, significantly ( $p < 0.01$ ) lower proportion of MSM in Visakhapatnam (57%) reported having heard of STI among men during R2, compared to 99% in R1.

A higher proportion of MSM were aware of at least 2 signs/symptoms of STIs among men during R2 in the districts of E. Godavari, Hyderabad and Guntur, while their proportion significantly ( $p < 0.01$ ) declined from 96% to 52% in Visakhapatnam district.

In general, most of the MSM in all the districts in both the rounds of the study reportedly heard about HIV/AIDS and also, were aware that the disease can be prevented. The proportion of MSM who were aware of correct methods to prevent transmission of HIV/AIDS ranged from 51% to 72% in R2 and from 40% to 69% in R1 in the districts surveyed and most of them collected the test results. The proportion of MSM who voluntarily underwent HIV testing increased significantly ( $p < 0.01$ ) in all the districts from 4% - 15% in R1 to 56% - 84% in R2. Significantly ( $p < 0.01$ ) higher proportion (26% - 34%) of MSM reported having heard of Antiretroviral therapy (ART) in R2 compared to R1 (7% - 17%), in all the study districts except Visakhapatnam district where it declined from 17% to 4%. Less than 6% in E. Godavari, Guntur and Hyderabad districts believed that ART will make people practice unsafe sex; while 76% in Visakhapatnam believed so **Table 4**.

**Table 3.** Distribution (%) of MSM according to condom use—by districts.

Particulars	East Godavari			Guntur			Hyderabad			Visakhapatnam		
	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value
During last sex act	77.4	87.2	0.05	63.4	83.5	0.006	69.9	69.8	0.986	88.0	92.9	0.251
Condom use with regular male partner	7.9	72.5	0.000	26.3	71.5	0.000	13.6	52.3	0.000	2.8	91.6	0.000
<b>n</b>	<b>209</b>	<b>280</b>		<b>71</b>	<b>198</b>		<b>135</b>	<b>255</b>		<b>316</b>	<b>244</b>	
During last sex act	56.9	87.5	0.70	18.8	0.0	-	9.49	0.0	0.0	75.1	100.0	0.583
Condom use with regular hijra partner	6.7	30.8	0.10	6.2	0.0	-	0.30	0.0	-	0.0	100.0	0.000
<b>n</b>	<b>149</b>	<b>3</b>		<b>257</b>	<b>0</b>		<b>130</b>	<b>0</b>		<b>88</b>	<b>0</b>	
During last sex act	89.6	96.2	0.23	74.6	89.1	0.014	91.8	91.6	0.963	91.3	90.2	0.769
Condom use with paying male partner	-	86.7	-	-	79.8	-	-	79.2	-	-	88.5	-
<b>n</b>	<b>142</b>	<b>114</b>		<b>106</b>	<b>158</b>		<b>146</b>	<b>259</b>		<b>364</b>	<b>191</b>	
During last sex act	82.9	90.7	0.41	70.4	97.6	0.001	50.4	98.2	0.000	92.7	95.2	0.525
Condom use with paid male/hijra partners	13.0	86.0	0.000	40.0	97.6	0.000	17.6	90.9	0.000	1.3	94.6	0.000
<b>n</b>	<b>147</b>	<b>71</b>		<b>170</b>	<b>24</b>		<b>158</b>	<b>54</b>		<b>122</b>	<b>179</b>	
During last sex act	76.5	86.8	0.04	68.9	95.4	0.000	78.2	93.9	0.000	88.2	89.9	0.686
Condom use with non-paying male/hijra partners	6.4	79.7	0.000	32.0	75.0	0.000	14.5	76.2	0.000	0.7	90.4	0.000
<b>n</b>	<b>359</b>	<b>382</b>		<b>356</b>	<b>392</b>		<b>358</b>	<b>379</b>		<b>387</b>	<b>369</b>	
During last sex act	-	100.0	-	-	100.0	-	-	<b>50.0</b>	-	-	96.0	-
Condom use with paid female partner	15.3	68.6	0.001	43.3	100.0	-	23.4	50.0	0.001	4.5	95.1	0.000
<b>n</b>	<b>108</b>	<b>3</b>		<b>196</b>	<b>5</b>		<b>100</b>	<b>1</b>		<b>97</b>	<b>90</b>	
During last sex act	-	13.7	-	-	14.0	-	-	15.8	-	-	32.4	-
Condom use with regular female partner	-	13.3	-	-	11.5	-	-	7.7	-	-	31.8	-
<b>n</b>	<b>-</b>	<b>198</b>		<b>-</b>	<b>236</b>		<b>-</b>	<b>122</b>		<b>-</b>	<b>150</b>	<b>-</b>
Ever used lubricant in anal sex	40.8	59.2	0.20	37.8	64.4	0.001	33.9	71.2	0.000	77.3	44.8	0.000
Carrying condom at the time of interview	28.7	54.1	0.003	7.3	42.1	0.000	30.1	54.3	0.000	41.7	36.2	0.420
Reported condom breakage in past 1 month	6.6	6.3	0.89	7.3	12.4	0.109	17.8	19.9	0.539	17.3	5.6	0.000
Wanted to use condom but couldn't in past one month	17.0	4.3	0.000	15.1	8.5	0.071	20.0	8.9	0.003	32.8	2.8	0.000
Refused to have anal sex without condom with any male partner in last 3 months	29.5	49.5	0.008	19.8	59.9	0.000	23.4	62.7	0.000	40.6	25.3	0.023
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	

**Table 4.** Distribution (%) of MSM according to knowledge of STI and HIV/AIDS—by districts.

Particulars	East Godavari			Guntur			Hyderabad			Visakhapatnam		
	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value
<b>Knowledge of STIs</b>												
Heard of STI among Men	94.0	91.3	0.29	82.5	92.1	0.003	85.4	92.9	0.020	99.2	56.7	0.000
Have no knowledge of STI symptoms among men	8.6	8.8	0.95	22.0	9.0	0.000	18.9	8.1	0.004	0.9	46.4	0.000
Knows at least 2 STI Signs/symptoms among men	86.6	91.2	0.19	71.9	90.9	0.000	71.3	91.7	0.000	95.8	51.8	0.000
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	
<b>Knowledge of HIV/AIDS</b>												
Ever heard of HIV/AIDS	99.4	99.5	0.85	99.7	99.7	0.978	100.0	100.0	-	98.7	92.8	0.014
Aware that HIV/AIDS can be prevented	94.5	92.1	0.30	86.0	98.0	0.000	87.2	95.3	0.019	95.3	90.3	0.094
Aware of correct methods to prevent transmission of HIV/AIDS	51.3	51.3	1.00	39.6	56.2	0.010	41.8	72.0	0.000	69.3	62.1	0.255
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	
<b>Undergone HIV testing</b>												
Ever undergone HIV test	14.5	80.2	0.000	15.0	83.9	0.000	14.3	77.8	0.000	4.3	56.1	0.000
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	
Undergone HIV testing voluntarily	62.3	67.6	0.61	54.4	54.5	0.986	70.0	53.3	0.072	30.9	67.5	0.003
Collected HIV test result	87.0	97.3	0.001	98.0	97.1	0.695	78.3	95.4	0.000	82.6	99.0	0.000
<b>n</b>	<b>59</b>	<b>321</b>		<b>61</b>	<b>339</b>		<b>58</b>	<b>315</b>		<b>18</b>	<b>224</b>	
<b>Knowledge of ART</b>												
Ever heard of ART	13.6	26.2	0.01	13.1	37.1	0.000	7.4	34.1	0.000	17.2	3.7	0.008
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	
Believe that ART will make people practice unsafe sex	66.6	6.2	0.000	18.5	3.0	0.028	0.0	5.9	0.512	57.8	75.8	0.405
<b>n</b>	<b>55</b>	<b>105</b>		<b>54</b>	<b>150</b>		<b>30</b>	<b>138</b>		<b>70</b>	<b>15</b>	

### 3.5. Exposure to Interventions

Exposure to program interventions by MSM in different Rounds of the study is given in **Table 5**. Exposure to program intervention indicators such as “aware of Avahan NGOs”, “aware of Non-Avahan NGOs”, “received services from NGOs”, “ever contacted by peer educator”, “visited NGO clinic”, “received referral services from NGOs”, “member of community based organizations group” had increased significantly ( $p < 0.01$ ) in all the districts.

### 3.6. Prevalence of HIV/AIDS & STIs

The prevalence of HIV and STIs among MSM in different districts is presented in **Table 6**.

The prevalence HIV increased from 13.1% in R1 to 20.8% in R2 in Guntur and from 24.7% to 28.9% in Hyderabad districts, while it declined from 22.2% to 20.8% in E. Godavari and from 9.3% to 4.9% in Visakhapatnam districts. However, these changes were not statistically significant.



**Table 5.** Exposure (%) to program intervention by MSM—by districts.

Particulars	East Godavari			Guntur			Hyderabad			Visakhapatnam		
	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value
<b>Exposure to interventions</b>												
Aware of AVAHAN NGOs	84.8	100.0	0.12	12.0	78.1	0.000	53.7	0.0	0.000	94.6	58.6	0.000
Aware of Avahan or Non-Avahan NGOs	84.8	100.0	0.12	12.0	78.1	0.000	53.7	82.4	0.000	94.6	58.6	0.000
Received services from Avahan/Non-Avahan NGOs	98.0	100.0	0.000	98.3	77.7	0.000	98.6	81.9	0.000	100.0	56.4	0.000
Contacted by Peer Educator/NGO worker in last one year	78.6	100.0	0.71	9.8	78.1	0.000	52.3	82.4	0.000	94.6	56.8	0.000
Received condoms from Peer Educator/NGO worker in last one year	76.3	100.0	0.89	9.8	77.8	0.000	51.5	82.2	0.000	92.8	56.6	0.000
Visited NGO clinic in last one year	55.1	100.0	0.001	4.9	77.9	0.000	28.3	68.5	0.000	42.2	54.6	0.056
Referred to other services by the NGO in last one year	9.1	55.8	0.000	0.0	76.7	0.000	3.0	73.4	0.000	2.3	36.5	0.000
Member of self help group	6.5	67.1	0.000	3.3	73.4	0.000	5.3	75.4	0.000	3.1	41.7	0.000
Member of community group	1.9	67.0	0.000	5.1	73.4	0.000	4.3	75.4	0.000	0.4	42.6	0.000
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	

**Table 6.** Prevalence (%) of HIV and STIs among MSM—by districts.

Particulars	East Godavari			Guntur			Hyderabad			Visakhapatnam		
	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value	R1	R2	p-value
HIV infection	22.2	20.8	0.80	13.1	20.8	0.066	24.7	28.9	0.361	9.3	4.9	0.053
Syphilis	13.0	5.0	0.01	3.5	8.6	0.025	15.6	12.6	0.450	5.6	1.9	0.024
Chlamydia	1.0	3.0	0.65	1.4	0.8	0.611	2.0	0.2	0.005	1.2	4.3	0.148
Gonorrhoea	0.0	0.0	-	0.5	0.1	-	0.9	0.5	0.584	0.5	0.1	0.210
<b>n</b>	<b>405</b>	<b>400</b>		<b>407</b>	<b>404</b>		<b>403</b>	<b>405</b>		<b>406</b>	<b>399</b>	
HSV-2	84.2	50.0	0.05	35.0	74.4	0.00	58.5	71.4	0.24	43.6	38.1	0.62
<b>n</b>	<b>42</b>	<b>40</b>		<b>42</b>	<b>42</b>		<b>41</b>	<b>40</b>		<b>41</b>	<b>42</b>	

The prevalence of syphilis decreased significantly ( $p < 0.05$ ) in E. Godavari (from 13% to 5%) and Visakhapatnam (6% to 2%) districts, while it increased from 3.5% to 8.6% in Guntur district, over the period.

The prevalence of Chlamydia significantly increased in Visakhapatnam district (1.2% to 4.3%), while similar trend was observed in the district of E. Godavari. However, the prevalence tended to decrease in the districts of Hyderabad (2% to 0.2%) and Guntur (1.4% to 0.8%).

#### 4. Discussion

Homosexuality, bisexuality and trans-sexuality are highly stigmatized in India. Men who have sex with men (MSM) are frequently abused; face physical violence and harassment from police and the general society [14] [17] [22]. There are limited data available in India on sexual behaviors linked to STI/HIV prevalence among MSM in Andhra Pradesh and India [18] [19] [22] [23]. The current paper presents the results from the studies that are conducted in Andhra Pradesh as part of a large scale intervention programme for the HIV prevention

among MSM by the Avahan program. The study is unique in terms of its magnitude and numerous behavioral and biological indicators collected in the process.

Avahan Intervention started in 2006 in the select districts in Andhra Pradesh and continued till the time of the round-2 of this evaluation. The populations who participated in both rounds of this study were self-identified men having sex with men. The first round of the study was conducted in 2006 while the second round was conducted in 2009. Consistent with other studies on MSM conducted in India and elsewhere, this study revealed that most MSM were in the younger age group and therefore, were at a higher risk of acquiring and transmitting HIV infection. Mean age of the respondents who participated mean age at sexual debut during both rounds remained almost similar. Most of the participants were localities in each district, indicating lesser migration in this high-risk group compared to female sex workers.

MSM in E. Godavari district shows a new trend of 9% staying with male partners, which is unusual in India and such behaviours carry a lot of stigma and discrimination. This can be result of the significant increase in community mobilization and empowerment activities like the community based groups seen in the district.

Condom use with all types of male partners (regular, main and commercial) increased significantly from round-1 of the study showing a clear impact of the interventions in changing behaviors. However, there has been a significant increase in the number of commercial partners across the districts, which might be indicating to a new trend of commercial sex among MSM, which according to other studies has been lower till date [21] [22], since sex among MSM had been mostly for pleasure and not for monetary gains [14] [24] [25]. About 45% of the MSM in Visakhapatnam district reported having a paid male/*hijra* partner, which is significantly higher than the earlier round and an increasing trend of having paying male partners is seen in Guntur and Hyderabad.

Many studies did indicate that MSM was more difficult to reach; which was always perceived as a bigger challenge for interventions [14] [15] [17] [25]. Results from this study however show a mixed result. While E. Godavari, Guntur and Hyderabad districts showed nearly 80% to 100% outreach by the program for condom distribution and clinical services, while Visakhapatnam districts showed lesser than 60% exposure to the program intervention. Interestingly, Visakhapatnam district had the highest program participation rates during R1, compared to R2.

A significant proportion of MSM reported having regular female partner during both the rounds of the study and the consistent condom use by MSM with these partners remained low during both the rounds, indicating high risk behavior. Impact of behavior change interventions is not seen in this regard, which could be because the program does not focus much on this aspect or because of social stigma. This is a crucial indicator for preventing the spread of HIV in the state. In addition, not all MSM use condom with their male partners. Thus, there exists potential risk of the bridge group spreading HIV to population at large.

Although an overwhelming majority of the respondents had heard of AIDS/HIV, only about 50% to 70% of them had correct knowledge on HIV. Knowledge in STIs among men was observed to be low in Visakhapatnam district in R2, compared to R1. High levels of knowledge about prevention of HIV/AIDS or STI alone is not enough to prevent risky behavior, unless attitudes also change [25].

Though the HIV prevalence during R2 decreased in Visakhapatnam, a significant increase was observed in the district of Guntur, while it remained high in the districts of E. Godavari, and Hyderabad, which was a matter of concern and needed to be further investigated. The prevalence of Chlamydial infection, though low increased during R2 in Visakhapatnam, but tended to decrease in other districts. The prevalence of syphilis during R2 increased two-fold in Guntur district, while it tended to decrease in the remaining districts.

HIV prevention programs in Andhra Pradesh need better focus on condom use MSM with female partners, and imparting knowledge on HIV/AIDS prevention. Program needs to take note of the increasing trend in having commercial sex. There is an urgent need to focus on the Visakhapatnam district as the program exposure and STI knowledge among the MSM is low. Though the HIV prevalence is among MSM in Visakhapatnam, in view of the low exposure to interventions, there is need to strengthen IEC activity to control the spread of the infection.

The findings in the study are subject to certain limitations. First, a sample size of 400 was considered for MSM at district level. Though this size is adequate to provide sufficiently precise estimates for high prevalence indicators such as condom use, it may be inadequate to precisely estimate other indicators such as HIV or STI prevalence. Self-identified MSM do not represent the whole MSM population and in the present study, only self-identified MSM contacted in the hot spots during the survey period are included as respondents.

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