



CONTRIBUTION OF A LARGE-SCALE HIV PREVENTION PROGRAM ON CONDOM USE BY LONG-DISTANCE TRUCK DRIVERS IN INDIA: A DECOMPOSITION ANALYSIS

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ABSTRACT

Background: This paper examines the impact of the HIV prevention programme among long-distance truck drivers in promoting consistent condom use with paid female partners in India.

Methods: The study utilizes data from two rounds of the Integrated Biological and Behavioural Assess met along National Highways (IBBS-NH), 2007 and 2009-10. Using the time location cluster sampling approach, major transshipment locations covering the bulk of India's transport volume along four route corridors were surveyed. Long-distance truck drivers were interviewed about their sexual behaviour, condom use practices, and exposure to HIV prevention interventions.

Results: Consistent condom use with paid female partners was increased by 11% among long distance truck drivers from round 1 to round 2 (Total increase 11%). Truckers exposed to intensive program exposure were two times more likely to use condom consistently with paid partners (OR 2.1; 95% CI 1.4-3.1; p-value <0.0001). Out of a total increase in consistent condom use with paid partners, truckers who were exposed to the program contributed 58%.

Conclusions: This study results highlight the ability of intensive programs to reach truckers who have sex outside marriage with HIV prevention interventions and promote safe sex practices among them.

Keywords: HIV prevention, IBBS, Truckers, Highways, time location cluster

INTRODUCTION

India has a large trucking population estimated at 5-6 million truckers and helpers, of whom 2-2.5 million are classified as long-distance truckers.¹ A long-distance truck driver is defined as a driver who takes a consignment from one destination to another, located along a national highway, traversing 800 kilometers one way before returning to the place of origin.² The sexual behavior of the trucking population is linked with the transmission of sexually transmitted infections (STIs) and HIV in India and elsewhere in Asia, Africa, South America and the United States.³⁻¹⁰ HIV prevention interven-

tions have often focused on truckers, given their high-risk behaviour, mobility and ability to spread infection to new geographic areas.^{3, 5, 9, 10}

In India, truckers have been a key population in the National AIDS Control Program as they constitute an easily identifiable and programmatically targetable sub-segment of men at risk.^{3, 10-14} In India the National HIV prevention program was managed and implemented by State AIDS Control Societies in each state by adopting strategies that were most relevant and effective to the local setting. Hence these interventions efficiently covered state-level truckers.^{10, 11, 14} However, long-distance

truckers who worked on the national highways were not specifically targeted in this intervention.¹⁴⁻¹⁶

In 2003, Avahan, the India AIDS Initiative was started in India with the aim of slowing down the HIV epidemic through focused, integrated, large-scale prevention programs among female sex workers (FSW), men who have sex with men, transgender individuals, injecting drug users and clients of FSWs along with long-distance truckers. To enhance accessibility of clinical services to truckers, *Khushi* (meaning 'happiness' in Hindi/Urdu) clinics were established at 17 major truck halt points in nine Indian states.^{10, 17, 18} The interventions for truckers included counseling by qualified counselors on safe sex practices, correct and consistent use of condoms and diagnosis and treatment for sexually transmitted infections (STIs) at *Khushi* clinics. It recruited peer educators, organized mid-media and mass media events (such as street plays, health games, film shows, truckers' festivals, distribution of audio cassettes/ compact discs), improved signage and satellite (i.e., mobile) clinical services at the halt points. Social marketing of condoms was promoted in partnership with condom marketing organizations by opening non-traditional outlets including at tea shops, tobacco outlets, and roadside cafes and eateries, and installing condom vending machines at strategically chosen places in transshipment locations. Details of the intervention are available elsewhere.^{10, 14, 19, 20}

A component of the evaluation design of the Avahan program included two rounds of large-scale cross sectional surveys among long-distance truck drivers, with both behavioral and biological components. These surveys were named as Integrated Behavioral and Biological Assessment (IBBA).^{13, 21} Evidence from these surveys confirmed that consistent condom use by long-distance truckers increased over time and exposure to the Avahan program was positively associated with safer sex practices among truckers.^{2, 13, 19, 20} In this context, we aim to quantify the contribution of the Avahan program in increasing consistent condom use in paid sex by long-distance truck drivers in India.

MATERIALS AND METHODS

Data

The study utilizes data from two rounds of the Integrated Biological and Behavioural Assessment along National Highways (IBBS-NH). We used data from both rounds of IBBA conducted in 2007 and 2009-10 respectively. Both survey rounds recruited long-distance truckers traveling along four route corridors (North-East, North-South, North-West and South-East), which cover the bulk of In-

dia's transport volume. The first survey round covered a total of 2,066 long-distance truck drivers whereas the second round covered a total sample of 2,085. An identical survey design and methodology were adopted in both survey rounds. A two-stage time-location cluster sampling approach was used to select the respondents. Behavioral data were collected through face-to-face interviews, using a pre-tested, pre-coded questionnaire translated into the local language by native speakers. The surveys collected information on demographics, work, mobility, sexual behavior, history and symptoms of STIs, knowledge of HIV and its prevention and exposure to HIV prevention interventions supported by Avahan and other agencies. Blood and urine samples were collected from all participating truckers. Anticubital venipunctured blood sample (5ml) collected in a vacutainer was allowed to clot for separation of serum and was stored at 2° - 8°C. From each participant, 30 ml urine sample was collected and from this 2 ml quantity only was stored in a urine specimen transport tube as per the protocol of M/s Gen-Probe Aptima Combo 2 Assay (Gen-Probe Incorporated, USA). Sera were tested for both HIV-1 and HIV-2 by Microlisa HIV kit (J. Mitra & Co. Pvt Ltd, India and GENEDIA HIV ½ ELISA 3.0 Kit, Gencross Life Science Corporation, Korea). Syphilis reactive serology was performed by Rapid Plasma Reagin Test Kit (Span Diagnostics Ltd, India) and was confirmed by Teponema pallidum hemagglutination assay (TPHA) using Syphagen TPHA Kit). All cases with RPR reactive serology of any titer with TPHA positivity were considered positive. For the diagnosis of *Neisseria gonorrhoeae* and *Chlamydia trachomatis*, urine samples were tested using Transcription-Mediated Amplification Assay and Dual Kinetic Assay (Gen-Probe Incorporated, USA). About 10 % of serum samples were screened for herpes simplex virus type 2 using HerpeSelect 2 ELISA IgG Kit (FOCUS Technologies, USA). A detailed description of the survey methodology and results from both rounds of survey are available.^{2, 13, 19, 22}

The study was approved by the relevant institutional review boards (Health Ministry Screening Committee, Government of India, Scientific Advisory Committee of National AIDS Research Institute, Protection of Human Subjects Committee of Family Health International and Scientific Advisory Committee and Ethical Committee of National Institute of Medical Statistics). Participation followed written informed consent and all data were recorded in a linked anonymous manner using numerically coded cards. Clinics run by the Transport Corporation of India Foundation at highway locations were used to enable participants to obtain syphilis test results and treatment upon

presentation of the numerically coded cards. Detailed information on the survey methodology can be found elsewhere (see IBBA report ¹³)

Measures:

Consistent condom use with paid female sex partners: Consistent condom use (yes, no) with paid female sex partners was the primary outcome variable for the analysis, and was defined as use of a condom in every sexual encounter with paid female sex partners in the past 12 months.

Exposure to the intervention:

Based on information from truckers on awareness of HIV prevention interventions and utilization of services from Avahan and non-Avahan interventions, three categories of program exposure were created: a) low program exposure - if truckers had no exposure to any HIV prevention intervention in the past 12 months or were exposed only to mass media (not contacted by any peer educators/outreach worker); b) moderate program exposure- if they received services only from non-Avahan interventions in the past 12 months; c) intensive exposure - if they received services either from Avahan or from both Avahan and non-Avahan interventions at least once in the past 12 months. Here 'services' was defined by any of the following: contacted by peer educators/ outreach workers, received condoms from peer educators or outreach workers, visited Avahan clinics, received counseling services on HIV/AIDS, participated any community meetings or events (such as street plays, health games, truckers' festivals) organized by Avahan clinics. Non-Avahan interventions included all interventions implemented by agencies other than Avahan. Our definition of classifying interventions under Avahan as being more intensive than interventions under other programs is consistent with those provided elsewhere.^{14, 18, 19}

Socio-demographic and work-related characteristics:

Socio-demographic characteristics included age (in completed years), education level (primary and below, middle school, secondary and above) and marital status (currently married, not currently married). Work-related characteristics were route category on which the respondent usually travels (North-East [NE], North-South [NS], North-West [NW] and South-East [SE]), average number of days taken to complete one round trip between main cities of operation (<12 days, ≥12 days) and ownership of truck by respondent (yes, no). These variables were derived based on single questions asked in the questionnaire.

Statistical techniques

Univariate and bivariate analyses were undertaken to examine the increase in program exposure and safe sex practices among long-distance truckers over time (from IBBA Round 1 (2007) to Round 2 (2009-10)). Multivariate logistic regression was used to assess associations between consistent condom use with paid female sex partners and survey rounds, select background characteristics and program exposure variables. Significant factors were further decomposed to estimate their contribution to increased consistent condom use over time. The change in consistent condom use between the survey rounds was decomposed by program exposure using the following formula:

$$C_b-C_a = (C_{b1}-C_{a1}) \frac{(W_{b1} + W_{a1})}{2} + (C_{b2}-C_{a2}) \frac{(W_{b2} + W_{a2})}{2} + (C_{b3}-C_{a3}) \frac{(W_{b3} + W_{a3})}{2}$$

In the formula above, 'a' and 'b' refer to two survey rounds; C_b-C_a denotes overall percentage change in consistent condom use between the survey rounds; C_{bi}-C_{ai} refers to percentage change in consistent condom use among truckers belonging to the ith category of the exposure variable (i=1 implies less exposure; i=2 implies moderate exposure; and i=3 implies intensive exposure). Similarly, W_{ai} and W_{bi} refer to proportion of truckers belonging to the ith category of the exposure variable.

The three additive terms on the right-hand side of the equation provide, respectively, the contributions of the above mentioned three categories of overall change in consistent condom use practices with paid female sex partners among long-distance truckers. Earlier studies suggest that by using the average values of the two points of time as weights for the category-specific differences, the above-mentioned decomposition formula neatly distributes the overall change into three components without leaving anything for the residual category of "interaction" effects. More information on this method can be found elsewhere.²³⁻²⁵ The percent contribution of each category was calculated using the formula mentioned below:

Percent contribution of long-distance truckers who received less program exposure-

$$[(C_{b1}-C_{a1}) \frac{(W_{b1} + W_{a1})}{2} / (C_b-C_a)] *100$$

Percent contribution of long-distance truckers who received moderate program exposure-

$$[(C_{b2}-C_{a2}) \frac{(W_{b2} + W_{a2})}{2} / (C_b-C_a)] *100$$

Percent contribution of long-distance truckers who received intensive (i.e., Avahan program) exposure-

$$[(C_{b3}-C_{a3}) \frac{(W_{b3} + W_{a3})}{2} / (C_b-C_a)] *100$$

RESULTS

A total of 2066 long-distance truckers in Round 1 and 2085 in Round 2 participated in the IBBA-NH. Table 1 presents the change in intensive program exposure and consistent condom use with paid female partners between the two IBBA rounds (Round 1 and Round 2) by selected background characteristics. In terms of route category, results indicate that truckers who travelled on the North-East route reported the highest increase in intensive program exposure (32.9%), while the consistent condom use in this group over the period of time rose by just 7.4%. In contrast, increase in consistent condom use was highest among truckers who travelled on the South-East route across this period (23.4%); however, the change in intensive program exposure across this period was just 9.6% in this group. While the increase in intensive program exposure was similar across both age groups, the percentage increase in consistent condom use was higher among truckers aged 35 years or older as compared to their younger counterparts ((19.3% vs 7.8%;). A somewhat similar increase in intensive exposure and consistent condom was observed by education level. The increase in both program exposure and consistent condom use was higher among truckers who were not currently married

and truckers who spent longer (12 days or more) to complete a single round trip as compared to others. Among those who did not own their truck, intensive program exposure increased by 29.5% and consistent condom use by 10.5%.

As seen in Table 2, truckers from Round 2 were more likely than truckers in Round 1 to use condom consistently with paid female sex partners (OR 1.54; 95% CI 1.1-2.1; p-value 0.005). Compared to truckers with no program exposure, those with either less intensive or intensive program exposure were more likely to use condom consistently with paid partners (moderate exposure: OR 1.4; 95% CI 1.0-2.0; p-value 0.027; intensive exposure: OR 2.4; 95% CI 1.4-3.1; p-value <0.001). Older truckers (≥35 years) were less likely to use condoms consistently as compared to younger counterparts (OR 0.6; 95% CI 0.4-0.8; p-value 0.001). Truckers who spent longer (12 days or more) to complete one round trip were less likely to use condoms consistently as compared to others (OR 0.6; 95% CI 0.5-0.9; p-value 0.007). Compared to those with higher education (completed secondary school and above), truckers with less education (illiterate or completed primary school level) were less likely to use condoms consistently with paid partners.

Table 1: Change in exposure to the Avahan program and safe sex behaviour with paid female sex partners from IBBA Round1 (2007) to Round2 (2009-10) ,among long-distance truck drivers in India

Background Characteristic	Received intensive program exposure			Consistent condom use with paid female partners		
	R1 ^a	R2 ^b	Absolute difference	R1 ^a	R2 ^b	Absolute difference
Route category						
North-East	19.7	52.6	32.9	72.1	79.6	7.4
North-South	22.9	45.3	22.4	74.5	79.7	5.2
North-West	23.2	49.0	25.8	72.5	80.9	8.4
South-East	5.8	15.4	9.6	64.3	87.7	23.4
Age (years)						
≤34	15.8	44.1	28.4	74.4	82.2	7.8
≥35	18.2	46.3	28.1	57.6	76.8	19.3
Education level						
Primary and below	14.3	37.9	23.6	65.4	76.4	11.0
Middle School	18.2	46.9	28.7	71.2	82.1	10.9
Secondary and above	17.6	49.4	31.8	75.4	85.1	9.7
Marital status						
Currently married	14.2	40.5	26.4	74.5	82.0	7.5
Not currently married	17.3	47.1	29.8	67.9	80.4	12.5
Ownership of truck						
Own	14.9	15.4	0.5	69.5	82.0	12.6
Others*	17.4	46.9	29.5	70.4	80.9	10.5
Average duration of one round trip (days)						
<12	16.2	42.6	26.4	73.7	83.2	9.5
≥12	16.5	45.8	29.3	66.4	79.7	13.3

* Includes Relative/acquaintance/friend/ Transporter /broker/others

^aOut of a total 641 truckers who reported paid sex in the 12 months preceding Round 1 of the survey.

^bOut of total 507 truckers who reported paid sex in the 12 months preceding Round 2 of the survey. R1- IBBA Round-1survey; R2- IBBA Round-2 survey

Table 2: Factors associated with consistent condom use with paid female sex partners by IBBA round (Round 1= 2007 and Round 2= 2009-10), program exposure and selected socio-demographics characteristics among long-distance truck drivers in India

Background Characteristic	Consistent condom use with paid female sex partners		
	Odds Ratio	95% CI	p-value
IBBA survey round			
Round 1 (2007)	1.0	Ref	
Round 2 (2009-10)	1.5	1.1- 2.1	0.005
Program exposure			
Low	1.0	Ref	
Moderate	1.4	1.0-2.0	0.027
Intensive	2.1	1.4-3.1	0.000
Age (years)			
≤34	1.0	Ref	
≥35	0.6	0.4-0.8	0.001
Average duration of one round trip (days)			
<12	1.0	Ref	0.007
≥12	0.6	0.5-0.9	
Education level			
Primary and below	0.7	0.5-0.9	0.018
Middle school	0.8	0.6-1.2	0.381
Secondary and above	1.0	Ref	
Route category			
North-East	1.0	Ref	
North-South	1.1	0.7-1.7	0.370
North-West	0.9	0.6-1.4	0.620
South-East	0.80	0.5-1.2	0.316
Marital status			
Currently married	1.0	Ref	
Not currently married	0.9	0.7-1.2	0.592
Ownership of truck			
Own	1.0	Ref	
*Others	1.0	1.0-1.01	0.563
Number of paid female sex partners			
≤ 2	1.0	Ref	
3 – 6	1.3	0.9- 1.8	0.108
≥7	1.0	0.7-1.5	0.815

OR = Odds Ratio; CI =Confidence Interval; *Includes Relative/acquaintance/friend/ Transporter /broker/others
 Program Exposure : low program exposure includes truckers with no exposure to any HIV prevention intervention in the past 12 months or exposure only to mass media (not contacted by any peer educators/outreach worker); moderate program exposure includes truckers who received services only from non-Avahan interventions in the past 12 months; intensive exposure includes truckers who received services either from Avahan or from both Avahan and non-Avahan interventions at least once in the past 12 months.

Results of the decomposition analysis, presented in Table 3, show that in R1, consistent condom use with paid partners was 64.2% among the truckers with low program exposure, while in R2, it was 88.5% among the truckers with intensive program exposure. The total increase in consistent condom use with paid female sex partners from Round 1 to

Round 2 was 11.0%. Out the total increase in consistent condom use with paid sex partners, truckers with intensive program exposure contributed 58.1%, those with moderate program exposure contributed 7.1%, and those with low program exposure contributed 28.9%. In terms of education level, each of the three categories contributed almost equally to the total increase; however, truckers 35 years or older contributed more as compared to relatively younger truckers (54.5% vs 45.5%), and those who spent more time to complete one round trip contributed more than those who spent less time (63.6% vs 36.4%) to the total increase in consistent condom use with paid sex partners.

DISCUSSION

As the study findings demonstrate, long-distance truckers who were exposed to the Avahan program are more likely to use condom consistently with paid female partners than others. This association is significant even after adjusting for the possible confounding effects of socio-economic and work-related characteristics. This suggests that truckers who are exposed to the Avahan program are more adoptive of safe sex practices, irrespective of their age, education level, marital status, and work-related characteristics including ownership of truck, the routes on which they usually travel and number of round trips. This establishes the strong positive effect of intensive program exposure on safe sex practices. A review of the literature suggests evidence of increase in consistent condom use in paid sex due to exposure to intensive HIV intervention programs.^{19, 26, 27} The magnitude of overall increase in consistent condom use with paid partners among long-distance truckers over the two rounds of the IBBA-NH survey shows that the main contribution to the overall increase in consistent condom use comes from long-distance truckers who are exposed to the Avahan program. Though there is an improvement in consistent condom use practices among truckers who were exposed to other non-Avahan programs over time, the major contribution has been from truckers who have been exposed to the Avahan program. This clearly suggests that the Avahan intervention program has had a strong impact on long-distance truckers to improve safe sex practices. This finding corroborates results of prior studies in India.^{19, 26}

While the study findings offer important insights into the effect of program exposure on safe sex practices, they must be interpreted in the light of certain limitations. For one, the contribution of the Avahan program presented here may not represent the net program contribution due to the confounding effect of other variables.

Table 3: Decomposition of total change from IBBA Round 1 (2007) to Round 2(2009-10) in consistent condom use with paid female partners by level of program exposure among long-distance truck drivers in India

Background Characteristic	Consistent condom use with paid female sex partners (R1)	Consistent condom use with paid female sex partners (R2)	Absolute change from R1 to R2	Proportion of long-distance truckers (R1)	Proportion of long-distance truckers (R2)	Percent change in consistent condom use with paid female sex partners from R1 to R2
Program exposure						
Low	64.2	73.6	9.4	0.4	0.3	28.9
Moderate	73.8	77.6	3.7	0.4	0.2	7.1
Intensive	74.3	88.5	14.2	0.2	0.4	58.1
Age (years)						
≤34	74.4	82.2	7.8	0.6	0.6	45.5
≥35	57.6	76.8	19.3	0.4	0.4	54.5
Education level						
Primary and below	65.4	76.4	11.0	0.4	0.3	36.4
Middle school	71.2	82.1	10.9	0.3	0.3	30.0
Secondary and above	75.4	85.1	9.7	0.4	0.4	33.6
Average duration of one round trip (days)						
<12	73.75	83.25	9.5	0.52	0.42	36.4
≥12	66.36	79.68	13.32	0.48	0.58	63.6
Total increase	70.1	81.1	11.0	-	-	-

Program Exposure: Low program exposure includes truckers with no exposure to any HIV prevention intervention in the past 12 months or exposure only to mass media (not contacted by any peer educators/outreach worker); moderate program exposure includes truckers who received services only from non-Avahan interventions in the past 12 months; intensive exposure includes truckers who received services either from Avahan or from both Avahan and non-Avahan interventions at least once in the past 12 months.

Moreover, the information on consistent condom and or exposure to the intervention were based on self-reports, which are subject to recall and social desirability biases. To the extent possible, these biases have been reduced by using a shorter-term recall period and anonymous interviews.

The current study provides important insights to support more effective HIV prevention efforts among long-distance truck drivers. Moreover, still about half or less of the targeted population had less exposure across the four routes. This demands continuing efforts with same intensity to increase the coverage in overall population as well as to achieve universal coverage among those who take greater risk.

CONCLUSIONS

The paper concludes that the Avahan intervention program has had a strong impact on the sexual behaviors of long-distance truckers in terms of adopting consistent condom use with paid sex partners. The findings suggest that the program has been able to reach high-risk truckers; and once exposed to intensive interventions, these high-risk truckers are more likely to adopt safe sex practices by using condom consistently in all commercial sex acts. Given that almost half of the long-distance truckers have less exposure to HIV intervention programs, our findings that HIV prevention programs be continued with the same intensity.

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