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Sexual Behaviors and Partner-Specific Correlates of Heterosexual Anal Intercourse Among Truck Drivers and Their Wives in South India

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Abstract

It is important to know about patterns of sexual behaviors among married couples in order to develop effective HIV prevention strategies for them. Herein we describe the sexual behaviors, estimate prevalence of anal intercourse (AI) among truck drivers (“truckers”) and their wives, and determine partner-specific demographic and behavioral correlates of AI. We carried out a cluster-sampled cross-sectional survey among 18–49 year-old wives and their trucker husbands in a south Indian district. Data were collected by same-gender research team members with color-coded computer-assisted interviews. We used random intercept logistic regression to identify the independent correlates of AI. Thirteen percent of 475 wives and 467 truckers reported ever having AI with their spouse. Of those who responded, 55 % of 40 wives and 47 % of 36 truckers never used condoms during AI. Of those who responded, 22 of 32 wives and 24 of 32 husbands felt that condoms were unnecessary during AI. Reporting ever having AI was associated with younger age and higher education of both husband and wife. AI reported by wives was associated with having sexual partner(s) other than husband (adjusted OR 8.8 [95 % CI 3.2–24.0]), correctly answering all HIV knowledge items (adjusted OR 4.9 [95 % CI 1.9–12.5]), husband’s sexual debut occurring before marriage (adjusted OR 1.9 [95 % CI 1.0–3.5]), and husband’s high HIV risk perception (adjusted OR 2.5 [95 % CI 1.2–5.4]). AI reported by truckers was associated with having sex with a male or transgender (adjusted OR 4.0 [95 % CI 1.2–13.3]). Reported prevalence of AI was high considering that in India anal sex is non-normative, heavily stigmatized and, criminal. Indian heterosexual mobile populations need to be informed about the greater risk of HIV infection consequent to unprotected AI.

Keywords

Sexual behavior; Heterosexual anal intercourse; Truck drivers; Wives; South India

Introduction

The association between migration, mobility, and infection with HIV has been documented since almost the beginning of the AIDS epidemic (Decosas, Kane, Anarfi, Sodji, & Wagner, 1995). Over the last decade, the HIV epidemic in India has been spreading from high-to low-risk populations, and from urban to rural areas, mainly through the bridge populations (Becker et al., 2007; Solomon, Chakraborty & Yepthomi, 2004; Solomon, Kumarasamy, Ganesh, & Amalraj, 1998). The most important bridge population appears to be long-distance truckers (“truckers”) and men who migrate between states for seasonal work in construction and other industries (Pandey et al., 2008). India has approximately 3.5 million truckers. They are more likely than other men to be clients of sex workers and sex work venues are common along major truck routes (Chandrasekaran et al., 2006; O’Neil et al., 2004). Truckers may become infected with HIV while away from home and then infect their wives when they return home. Such “truncated epidemics” are characteristic of rural areas of India (Singh & Malaviya, 1994; Steinbrook, 2007).

The complexity of sexual behavior patterns requires a conceptual framework to understand patterns of occurrence of sexually transmitted infections (STIs), including HIV (Aral, 2004; Hayes, Kapiga, Padian, McCormack, & Wasserheit, 2010). Within this paradigm of behaviors, marital sex is generally considered low risk. To effectively address the protection needs of married couples, it is imperative to understand the forms and frequency of sexual expression within marriage. Information about both partners can greatly enhance the epidemiological value of sexual behavior data. Although cultural norms in India dictate certain sexual behaviors between men and women, designing appropriate intervention strategies may be less straightforward when certain sexual practices are not socially accepted or culturally taboo, such as anal intercourse (AI).

In India, there is growing evidence for the practice of AI by married men who have sex with men (MSM) and its impact on their wives and the HIV epidemic in general (Phillips et al., 2010; Setia et al., 2006; Setia, Sivasubramanian, Anand, Row-Kavi, & Jerajani, 2010; Solomon et al., 2010). Very little is known about this practice among heterosexual couples. Reported prevalence of AI among married couples ranges from 1 to 20 % in urban areas (Avasthi et al., 2008; Raizada, Gupta, & Kumar, 2002; Savara & Sridhar, 1992; Singh, Mondal, & Sharma, 2009). The prevalence of ever engaging in AI among the clients of female sex workers in Mumbai was 0.3 % with girlfriends, 1.4 % with wives, and 3.3 % with brothel-based sex workers (Singh et al., 2009). Eleven percent of homosexually active rural men in five states of India reported ever practicing AI with their wives (Verma & Collumbien, 2004).

Although estimates of the transmission probability for heterosexual AI are still lacking, receptive AI has the highest risk of HIV acquisition per coital act, ranging from 0.04 to 3.0 % (Fox & Fidler, 2010). Heterosexual AI has been found to be associated with STIs, including HIV, among both men and women in the United States (Gorbach et al., 2009; Javanbakht et al., 2010; Manhart et al., 2004; Skurnick et al., 1998), Brazil (Guimaraes, Munoz, Boschi-Pinto, & Castilho, 1995), and India (Rodrigues et al., 1995). AI among

women in India attending STI clinics was reported as an important predictor for the prevalence of herpes simplex virus 2 antibodies (van de Laar et al., 1998).

Studies from the United States have indicated several factors associated with the practice of heterosexual AI, including anonymous sex, concurrent partners, injection drug use, substance use, number of sex partners, sex in exchange for drugs or money, sex toy use, sex with injection drug users, and condom use (Gorbach et al., 2009; Javanbakht et al., 2010; Roye, Krauss, & Silverman, 2010). Estimating the prevalence and correlates of AI among heterosexuals can inform the need for addition of rectal microbicides in the slowly growing repertoire of female-controlled methods for STI/HIV prevention (Ventuneac et al., 2010).

Information on risky sexual behaviors within marriage can help to guide interventions specific to the STI/HIV prevention needs of the low-risk groups of married couples. We sought to estimate the prevalence of risky sexual behaviors, including AI, and to determine partner-specific demographic and behavioral correlates of AI among truckers and their wives.

Method

Participants

We conducted a community-based cross-sectional survey, using stratified cluster sampling, among 18–49 year-old wives of truckers and their husbands in Namakkal district (63.5 % rural population [Gupta et al., 2007]) of Tamil Nadu state in India. We used a list of married truck drivers with their home addresses, including village/town, prepared with information from local networks and non-government organizations (NGOs). These villages/towns comprised 39 clusters that were listed along with the number of truckers in each. These clusters were stratified by four subdistricts within Namakkal district, based on the proportion of truckers identified in each subdistrict. Within each subdistrict, clusters were selected based on the proportion of truck drivers in each cluster. We randomly selected 13 truckercouples in each cluster.

Procedure

Using a structured questionnaire in Tamil, we collected data in the participants' homes or a private location in the neighborhood between June and October 2010, using color-coded audio computer-assisted self interviews (C-ACASI) (Bhatnagar, Brown, Saravanamurthy, Kumar, & Detels, 2013). After obtaining written consent, the participants were counseled before drawing blood samples to test for HIV. The test results were made available to the participants after post-test counseling.

Marital relationship-related attitudes were measured according to a 7-item scale (e.g., “A good wife obeys her husband even if she disagrees”; “A man has a good reason to hit his wife if she disobeys him”) (Cronbach's alpha 0.66), wherein a lower score indicated male dominance (Henrica & Watts, 2003). Sexual relationship power was measured by a combination of a 13-item relationship control subscale (e.g., “My partner always wants to know where I am”; “My partner would get angry if I suggested condom use”) (Cronbach's alpha 0.82) and a 6-item decision-making dominance subscale (e.g., “Who usually has more

say about whether you have sex?; “Who usually has more say about important decisions?”) (Cronbach’s alpha 0.74) (Pulerwitz, Gortmaker, & DeJong, 2000). A high score represented dominance of wives in making decisions related to sexual and other activities with the husband (Cronbach’s alpha 0.83 for the overall scale). “Regular partner” was defined as a person of opposite gender other than the spouse with whom the participants had extramarital sexual relations on a routine basis without any monetary exchange and “casual partner” was defined as a sex partner of opposite gender other than spouse, regular or paying partner. Frequency of condom use during vaginal intercourse was ascertained as every time/most times, sometimes, or never.

Measures

Low reporting of certain behaviors and variable response rates for several sensitive questions was reflected in the changing denominators for the estimation of various parameters. We calculated the frequency of categorical variables and mean and SD for continuous variables. Participants were considered to have correct knowledge of HIV if they correctly answered all 11 knowledge questions. Wives having any type of male sexual partner (regular/casual/paid) other than their husband were classified together in one group.

We compared the distribution of selected characteristics of participants who reported engaging in AI during their married life, using Pearson’s χ^2 test for categorical variables and the Wilcoxon rank sum test for continuous variables. Based on a priori information from the literature or p value ≤ 0.05 in univariate analysis (Afifi, Clark, & May, 2004), covariates were identified to build a separate conceptual model for each of the predictors of AI. For the multivariate logistic regression, each predictor was adjusted for the relevant covariates according to the conceptual models (Fig. 1). We used different models suited to estimate the total effect of each predictor on the outcome (Westreich, & Greenland, 2013). We used the random intercept logistic regression model to account for within-subject correlations due to the cluster sampling design (Rabe-Hesketh & Skrondal, 2008). Data were analyzed using Intercooled Stata version 11.0 (StataCorp LP, TX, USA).

The study was approved by the UCLA Institutional Review Board and the Institutional Ethics Committee of the National Institute of Epidemiology, Indian Council of Medical Research, Chennai, India.

Results

We interviewed 486 wives and 473 truck drivers, with overall response rates of 96 and 93 %, respectively. Response rates varied for different questions, especially those eliciting sensitive information, which is reflected in the changing denominators.

Sociodemographic Characteristics of the Truckers and Their Wives

Mean age of the wives and truckers was 30 and 37 years, respectively. All except one were Hindu. A total of 339 (70 %) wives were literate, among whom 178 (52.5 %) had passed high/ higher secondary school. Among the husbands, 391 (83 %) of 471 were literate. Of

484 women, 354 (73 %) had some source of income, with 200 (41.3 %) being agricultural laborers. The husbands had been working as truckers for an average of 12 years (Table 1).

Marital/Sexual Relationships of Truckers and Their Wives

Forty one (9 %) of 471 wives and 138 (30 %) of 461 truck drivers reported their sexual debut occurring before marriage. Of 471 truck drivers, 342 (73 %) slept at home for 14 days or less in the month prior to the survey. Sexual relationship control within marriage was reported to be low by 197 (43 %) of 454 wives. The average marital relationship-related attitude score was 9.9 (95 % CI 9.6–10.2) among 421 truckers and was significantly lower than the average score of 11.1 (95 % CI 10.8–11.4) among the wives, indicating male dominance in the marriage. Sexual relationships with spouses were rated as good/excellent by 419 (82 %) of 486 wives and 351 (77 %) of 454 truckers. Of 475 wives, 418 (88 %) reported vaginal intercourse with their husband during the past month an average of eight times (range, 1–30). Of the 447 wives, 175 (41 %) were usually involved in making the decisions, either solely or with their husband, about using condoms during intercourse. Condoms were reported to be never used during vaginal intercourse with husbands by 315 (68 %) of 463 wives (Table 1). Alcohol was usually consumed before intercourse by 111 (24 %) of 462 truckers. A total of 213 (46 %) of the 461 truckers reported consuming alcohol before their last intercourse.

Overall, 52 (11 %) of 469 wives and 132 (28 %) of 466 truckers reported other sexual partners of the opposite gender that included regular (non-paying), casual or paid/paying partners in the past three months prior to the survey. Twenty one (72 %) of 29 wives who responded rated the quality of sexual relationships with their regular extramarital partners as good/excellent, compared to 82 % of 486 wives who rated their relations with their husbands similarly ($\chi^2 = 2.14$, $df = 1$). Twenty four (73 %) of 33 wives who responded to the question about the decision to use condoms were the decision makers, solely or with their regular partner. This was significantly different from the decision-making role with their husbands ($\chi^2 = 80.3$, $df = 1$, $p < .0001$). Of the 32 wives who responded, 29 (91 %) reported no/occasional use of condoms during vaginal intercourse with regular partners. The most common reasons for not using condoms included feeling they were not necessary with regular partners (59 %), partner not liking condoms (57 %), and use of other contraceptive methods by the women (55 %). Thirteen (3 %) of 468 wives ever had a paying male partner, among whom four of five reported having sex during husbands' absences. Five of 12 wives who responded reported using condoms during last vaginal intercourse with extramarital partners. This was significantly higher than condom use with husbands (Fisher's exact test, $p = .01$). Ever having a casual male partner was reported by 18 (4 %) of 467 wives, with seven of them reporting between one and four partners. The male partners of nine (60 %) of the 15 wives who responded to the question made the decision about using condoms. Only two (12 %) of 16 wives reported condom use during last vaginal intercourse with an extramarital partner. Twenty-two (5 %) of 465 truckers reported having a sexual relationship with another man or transgender (Table 1).

Knowledge About STIs and HIV/AIDS and Risk Perception

Of the 468 wives, 336 (72 %) knew at least one female STI symptom, and among the truckers, 370 (83 %) of 471 knew at least one male symptom. Any STI symptom in the last 12 months was reported by 65 (14 %) wives and 98 (21 %) truckers. Among the 483 wives and 473 truck drivers, 416 (86 %) and 447 (94 %), respectively, reported hearing about HIV/AIDS before the survey. Of 461 wives, 318 (69 %) knew that HIV infection can be prevented. Only 30 (8 %) of 396 wives who responded to all the HIV knowledge-related questions gave correct answers for all items. Overall, 399 (85 %) of 470 truckers knew that HIV can be prevented, but only 15 (4 %) of them gave correct answers for all the questions (Table 1). Of 463 wives who responded, 455 (98 %) did not feel at risk for HIV infection. The level of risk felt for their husbands was reported as moderate to high by 50 (11 %) of 457 wives. Seventy (16 %) of 450 truckers felt themselves to be at risk for HIV infection, but only 10 (2 %) of 444 felt that their wife was at risk.

Prevalence and Characteristics of AI Reported by the Truck Drivers

Responses to ever having AI were available from 413 couples. Among them, AI was reported by 10 couples and 339 reported negatively, giving an overall concordance of 84.5 %. Sixty-one (13 %) of 467 truckers reported ever having AI with their wife. Seventeen (47 %) of 36 truckers who responded to the question never used condoms during AI with their wife. Of the 32 truckers who responded, 24 (75 %) felt that condoms were not necessary during AI or at all with their wife. Of the 78 truckers who responded, 12 (15 %) reported AI with women other than their wives. Twenty-two (5 %) of 465 truckers reported practicing receptive or insertive AI with a male or transgender.

Fifty-four percent of the truckers reporting AI were educated up to high school, compared to 40 % among those who did not report AI ($p = .016$). Forty-three percent of the truckers reporting AI had their sexual debut before marriage, compared to 28 % who did not report AI ($p = .027$). Forty percent of the truck drivers who reported AI had a female sexual partner other than their wife, compared to 26 % among those who did not report AI ($p = .048$). Fewer of the truckers reporting AI never used condoms during vaginal intercourse with their wives than those who did not report AI (43 vs. 70 %, $p < .001$). Among those reporting AI, 9 % reported having had sex with a male or transgender, compared to 3 % among those who did not report AI ($p = .031$) (Table 2). We did not find any significant differences between truckers reporting AI and those who did not, according to the characteristics and behaviors of their wives (data not shown).

Prevalence and Characteristics of AI Reported by the Wives of Truckers

Sixty-one (13 %) of 475 wives reported having ever engaging in AI with their husband. Twenty-two (55 %) of the 40 wives who responded to the question never used condoms during AI with their husband. Of the 32 wives who responded, 22 (69 %) felt that a condom was not necessary during AI with their husband. Of the 34 wives who responded, six (18 %) reported AI with males other than their husbands.

Among those reporting AI, 49 % were 18–27 years old compared to 36 % among those who did not ($p = .004$). Fifty-four percent of the wives reporting AI were educated up to high school compared to 35 % who did not report AI ($p = .002$). Thirty nine percent of the wives who reported AI had a male sexual partner other than their husband compared to 7 % among those who did not report AI ($p < .001$). Fewer of the wives who reported AI never used condoms during vaginal intercourse than those who did not report AI (48 vs. 71 %, $p = .001$). Significantly more wives among those who reported AI knew that HIV can be prevented and correctly answered all of the HIV knowledge-related questions. Among those reporting AI, 25 % of the husbands were 38–55 years old, compared to 47 % in that age group who did not report AI ($p = .021$). Sixty-one percent of the husbands were educated up to high school among those who reported AI, compared to 39 % among those who did not report AI ($p = .002$). Husbands having their sexual debut before marriage and feeling at risk for HIV infection were significantly more common among those who reported AI (Table 3).

Partner-Specific Characteristics Associated with AI Reported by Truckers and Their Wives

After adjusting for relevant covariates, reporting by the truckers of ever practicing AI was significantly associated with sexual debut before marriage (adjusted odds ratio [AOR] 1.9; 95 % CI 1.0–3.4) and having had sex with a male or transgender (AOR 4.0; 95 % CI 1.2–13.3) (Table 4).

Reporting by the wives of ever practicing AI was significantly associated with the wife having a sexual partner(s) other than her husband (AOR 8.8; 95 % CI 3.2–24.0), the wife answering all HIV knowledge items correctly (AOR 4.9; 95 % CI 1.9–12.5], husband's sexual debut before marriage (AOR 1.9; 95 % CI 1.0–3.5), and husband perceiving himself to be at risk for HIV infection (AOR 2.5; 95 % CI 1.2–5.4) (Table 4).

Discussion

The majority of the truckers and their wives had a high level of satisfaction in their sexual relationships with their spouses. Nearly one in 10 wives and 3 in 10 truckers reported ever having an extramarital relationship. Condom use during vaginal intercourse was very low with spouses and other partners. HIV risk perception for self and spouse was very low among both the truckers and their wives.

The reported prevalence of 13 % of truckers and their wives ever engaging in AI was relatively high, given the sociocultural and legal context of sexual behaviors in India, where anal sex is considered non-normative, heavily stigmatized and, criminal under Section 377 of Indian Penal Code 63 (repealed by the Delhi High Court in July 2009 for consensual anal sex between adults) (Herget, 2006; Judgement on IPC Section 377, 2009). The sexual experiences of married women in India are generally influenced by the differences in gender power relations, cultural expectations, marital sexual relationships, and perceptions of appropriate male and female behavior (George, 1998). It is possible that the women in the study were coerced into AI by their husbands. However, we did not find any significant

association between marital relationship attitudes or sexual relationship control and reporting of AI by the wives.

AI was more common among younger, more educated couples in our study sample. Young people, males in particular, may be increasingly exposed to explicit sexual information and depictions from the media and pornography (Verma & Mahendra, 2004), including the internet, and more open to sexual experimentation. We also hypothesize that some of the younger couples could be using AI as an alternative to avoid pregnancy without using the traditional methods of contraception, including condoms during vaginal intercourse. An in-depth exploration into the perceptions and motivations for AI among heterosexual married couples is required to achieve a better understanding of the circumstances and to substantiate the hypothesis.

The likelihood of using condoms during vaginal intercourse was higher among the wives and truckers reporting AI, although not statistically significant in multivariate analysis. Further, both the truckers and wives disliked using condoms or felt they were not necessary during vaginal intercourse (data not shown). As only a subset of the study participants were asked about reasons for inconsistent condom use, we could not ascertain the association of the responses regarding AI. Condom use was even less common for AI, with most participants feeling it was not necessary. AI could be a way to enjoy the pleasure of intercourse without the need for using condoms. However, not using condoms during anal sex adds an increased likelihood of infection with STIs, including HIV (Tian et al., 2008).

AI was more common among truckers and wives having extramarital relationships, wives having correct HIV-related knowledge, and husbands feeling themselves to be at risk for HIV infection. Although a minority of truckers reported having sex with a male or transgender, they were more likely to report AI with their wives. We hypothesize that either these men might have found AI more pleasurable than vaginal intercourse or had a homosexual orientation but were married due to social pressure (Solomon et al., 2010). These findings suggest that participants were aware of their own risky behaviors and about heterosexual transmission of HIV, but not necessarily via AI, and might perceive AI as safe in the context of avoiding transmission of infection to their spouses. There is a widespread belief in India that vaginal intercourse is the primary route of sexual transmission of HIV and condom use is therefore not deemed necessary for AI (Bhattacharya, 2004; Mukhopadadhyay, Nandi, Nundy, & Sivaramayya, 2000; Nag, 1995).

HIV prevention messages for the heterosexual population focus on vaginal sex. Safe-sex messages delivered through the media, health care providers, and counselors need to be broadened to include specific and explicit information about HIV risks associated with all types of sexual activities, including AI.

We did not find a significant association between reported AI and prevalence of HIV infection. Our analysis was constrained by the small number of HIV infections, as well as by the number of participants reporting AI. Population-level longitudinal studies documenting HIV incidence and sexual patterns are required to estimate the impact of AI on the burden and spread of infections. Further, AI may have been under-reported or misunderstood as

‘sex from behind’ instead of insertive AI, as found in other cross-cultural studies of AI (p. Gorbach; personal communication, July 3, 2011).

Our study had several limitations. The non-response rates for several sensitive questions were high, leading to missing data. Hence, we used only complete data for subgroup analyses, which may have reduced the precision of certain estimates and the power to detect all associations. It is difficult to ascertain the temporality of the associations, due to the inherent nature of cross-sectional studies. The participants were asked to recall their marital and extramarital sexual behaviors over the past 3 months or year (for some items) and may have had difficulty remembering all events and/or frequency of the same for all partners. Nevertheless, the recall bias should be minimal and non-differential when analyzing the association between various sexual behaviors and AI. Further, all questions were asked in a similar manner through the C-ACASI system, eliminating interviewer bias contributing to differential recall. The sampling frame of truckers was created based on information from local networks and non-government organization (NGOs) providing HIV-related services in the area. It is possible that we may have missed a few villages with relatively fewer resident truckers or those not reached by the NGOs. However, the number of such truckers would be low and unlikely to have affected the generalizability of the findings to the study area.

Risky behaviors such as AI can increase the vulnerability of heterosexual couples to HIV/STI infection and more so for women (Baggaley et al., 2012). Designing effective and culturally sensitive interventions will require more detailed and systematic data on the patterns of sexual behaviors within marriage and gender-specific perceptions of AI. A recent study among truckers from Hyderabad suggests a high level of willingness to accept new HIV prevention interventions (Prem Kumar et al., 2013). It is important to increase awareness among Indian heterosexuals, particularly mobile populations, about the greater risk of HIV infection consequent to AI.

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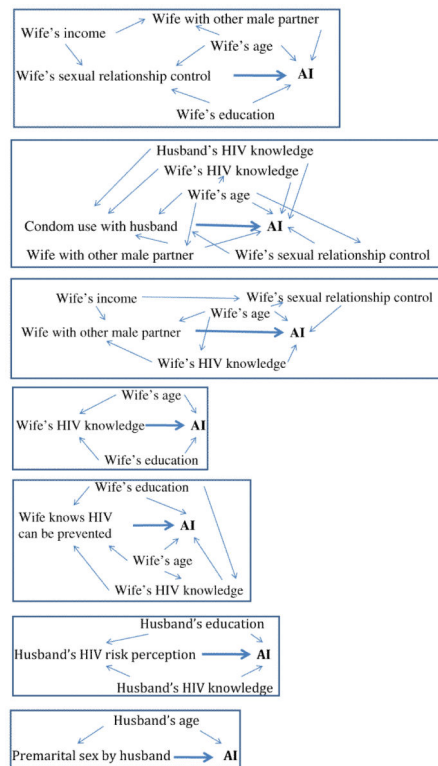


Fig. 1.
Conceptual models (Directed Acyclic Graphs) for the association between various characteristics/behaviors and ever practicing anal intercourse among truck drivers and their wives

Table 1

Characteristics and behaviors of truck drivers and their wives, Namakkal district, Tamil Nadu, India, 2010

Characteristics/behaviors	Wives				Truck drivers			
	N	n	%	M (SD)	N	n	%	M (SD)
Sociodemographics								
Age (years)	486			30.1 (6.4)	473			36.7 (6.6)
Have children	486	456	93.8					
Number of children	486			.9 (.2)				
Literate	486	339	69.8		471	391	83	
Main source of income	486							
None		130	26.9					
Agricultural labor		200	41.3					
Non-agricultural		154	31.8					
Mean Monthly income (INR)	340	1,589.7	(530.3)		471		7,447.5	(2,756.1)
Mean Monthly household income (INR)					471		8,599.8	(2,343.8)
Dependent household members	484			4.1 (.8)				
Marital relationship-related attitudes score	431			11.1 (1.8)	421			9.9 (2.2)
Sexual relationship control	454							
Low		197	43.4					
Medium		222	48.9					
High		35	7.7					
Sexual behavior								
Sex debut before marriage	471	41	8.7		461	138	29.9	
Age at marriage (years)	473			18.2 (2.2)	464			24.1 (2.2)
Used condom during last vaginal intercourse	461	57	12.4		463	41	8.9	
Had regular (non-paying/paid) partner of opposite gender other than spouse	467	34	7.3		466	67	14.4	
Had paying/paid partner of opposite gender in past 3 months	468	12	2.6		469	10	2.1	
Had casual partner of opposite gender in past 3 months	466	16	3.4		464	26	5.6	
HIV-related knowledge responses								
HIV can be prevented by abstaining from sex	466	308	66.1		465	366	78.7	
HIV can be prevented by always using condom during sex	462	337	72.9		464	423	91.2	
HIV can be prevented by having sex with only one partner	464	440	94.8		468	434	92.7	
HIV can be prevented by avoiding sharing of injection syringes/needles	462	384	83.1		465	358	77.0	
HIV can be prevented by checking blood before transfusion	465	438	94.2		463	430	92.9	
HIV cannot be transmitted by bites of mosquitoes or other insects	462	342	73.9		465	330	71.0	
HIV cannot be transmitted by sharing clothes or eating utensils	460	364	79.1		462	383	82.9	
HIV cannot be prevented by eating nutritious food	460	363	78.9		462	355	76.8	
Healthy-looking person can be infected with HIV	455	201	44.2		447	154	34.5	
HIV can be transmitted from mother to child	454	263	57.9		452	244	54.0	
Medicines can help treat people with HIV/AIDS	449	107	23.8		444	117	26.4	

Distribution of ever practicing AI reported by truck drivers according to characteristics and behaviors of truck drivers and their wives, Namakkal district, Tamil Nadu, India, 2010

Characteristics/behaviors	Characteristics of truck drivers						Characteristics of wives					
	AI reported by truck driver											
	Yes	No	p value				Yes	No	p value			
	N	n	%	N	n	%	N	n	%	N	n	%
Age (years)	61			406			56			391		
≤27	7	11.5		27	6.7		21	37.5		144	36.8	
28–37	30	49.2		198	48.8		27	48.2		189	48.3	
≥38	24	39.3		181	44.6		8	14.3		58	14.8	
Education	61			404			56			391		
Illiterate	5	8.2		73	18.1		15	26.8		122	31.2	
Primary/middle school	23	37.7		169	41.8		24	42.9		118	30.2	
≥ High school	33	54.1		162	40.1		17	30.4		151	38.6	
Monthly income (INR)	61	7,500		404	7,500		39	1,500		273	1,500	
		(6,000–9,000) ^b			(6,000–8,000) ^b			(1,000–2,000) ^b			(1,400–2,000) ^b	
Age at marriage (years)	59	24 (21–25) ^b		401	24 (23–25) ^b		54	18 (17–20) ^b		381	18 (17–19) ^b	
Sexual debut before marriage	58	25	43.1	400	112	28	53	6	11.3	381	30	7.9
Quality of sexual relationship rated as good/excellent	59	40	67.8	392	309	78.8	56	44	78.6	391	326	83.4
Low relationship control	[Not applicable]						52	20	38.5	368	163	44.3
Had vaginal intercourse with spouse in last 30 days	57	51	89.5	399	329	82.5	55	51	92.7	381	337	88.5
Condom use during vaginal intercourse with spouse	61			396			52			375		
								<.001 ^a				
Always/most times	10	16.4		28	7.1		7	13.5		32	8.5	
Sometimes	25	41		92	23.2		11	21.1		82	21.9	
Ever	26	42.6		276	69.7		34	65.4		261	69.6	

Characteristics/behaviors	Characteristics of truck drivers						Characteristics of wives							
	AI reported by truck driver													
	Yes		No		p value		Yes		No		p value			
	N	n	%	N	n	%	N	n	%	N	n	%		
Had female sexual partner other than wife	60	24	40	403	105	26.1	.048	52	7	13.5	379	39	10.3	ns
Knew that HIV can be prevented	61	56	91.8	403	338	83.9	ns	52	39	75	374	259	69.2	ns
Correct knowledge about HIV	49	3	6.1	349	12	3.4	^d _{ns}	45	4	8.9	320	24	7.5	^d _{ns}
Feel at risk for HIV	56	4	7.1	393	65	16.5	^d _{ns}	51	1	2	374	7	1.9	^d _{ns}
Feel spouse at risk for HIV	54	1	1.8	389	8	2.1	^d _{ns}	52	9	17.3	370	38	10.3	ns
Had any STI symptom in past 12 months	61	11	18	403	85	21.1	ns	55	9	16.4	377	46	12.2	ns
HIV-positive	60	0	0	374	7	1.9	^d _{ns}	55	1	1.8	375	7	1.9	^d _{ns}
HSV-2-positive	60	8	13.3	374	58	15.5	ns	55	16	29.1	375	103	27.5	ns
Always/most times have alcohol before sex with wife	59	17	28.8	399	93	23.3	ns	[Not applicable]						
Ever had sex with male partner	56	5	8.9	401	10	2.5	.031	[Not applicable]						

^a Chi square for trend^b Median (IQR)^c Wilcoxon rank sum test^d Fisher's exact test

Table 3

Distribution of ever practicing AI reported by wives of truck drivers according to characteristics and behaviors of wives and their husbands, Namakkal district, Tamil Nadu, India, 2010

Characteristics/behaviors	Characteristics of wives						Characteristics of truck drivers											
	AI reported by wives																	
	Yes			No			p value			Yes			No			p value		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
Age (years)	61			414						56		.004 ^a	387					.021
≤27		30	49.2		147	35.5				6	10.7			27	7			
28–37		29	47.5		200	48.3				36	64.3			178	46			
≥38		2	3.3		67	16.2				14	25			182	47			
Education	61			414						56		.002 ^a	385					.002 ^d
Illiterate		10	16.4		132	31.9				4	7.1			73	19			
Primary/middle school		18	29.5		138	33.3				18	32.1			160	41.6			
≥ High school		33	54.1		144	34.8				34	60.7			152	39.5			
Number of children	61	2 (2–3) ^b		414	2 (2–3) ^b					[Not applicable]		ns ^c						
Monthly income (INR)	42	1,500		292	1,500					[Not applicable]		ns ^c						
		(1,000–2,000) ^b			(1,200–2,000) ^b													
Age at marriage (years)	59	18 (17–19) ^b		411	18 (17–19) ^b					[Not applicable]		ns ^c						
Sexual debut before marriage	59	8	13.6	409	33	8.1				55	24	43.6	377	104	27.6			.012
Quality of sexual relationship rated as good/excellent	61	46	75.4	414	342	82.6				54	38	70.4	374	296	79.1			ns
Low relationship control	55	31	56.4	394	165	41.9				[Not applicable]		ns						
Had sexual partner(s) of opposite gender other than spouse	57	22	38.6	412	30	7.3				54	20	37	382	106	27.8			ns
Knowledge of at least one STI symptom	57	47	82.5	402	285	70.9				56	46	82.1	385	321	83.4			ns
Knew that HIV can be prevented	56	48	85.7	397	267	67.2				55	51	92.7	385	323	83.9			ns
Correct knowledge about HIV	47	12	25.5	349	18	5.2				49	2	4.1	326	12	3.7			^d ns
Feels at risk for HIV	56	2	3.6	406	6	1.5				54	14	25.9	368	53	14.4			.026
Felt spouse is at moderate/high risk for HIV	57	6	10.5	399	44	11.0				53	2	3.8	365	6	1.6			^d ns

Characteristics/behaviors	Characteristics of wives						Characteristics of truck drivers							
	AI reported by wives													
	Yes		No		p value		Yes		No		p value			
	N	n	%	N	n	%	N	n	%	N	n	%	p value	
Had any STI symptom in past 12 months	57	8	14	402	55	13.7	ns	56	14	25	384	77	20.1	ns
HIV-positive	54	2	3.7	390	6	1.5	^d ns	58	0	0	383	8	2.1	
HSV-2-positive	54	12	22.2	390	110	28.2	ns	58	7	12.1	383	60	15.7	ns
Had vaginal intercourse with husband in past 30 days	61	57	93.4	413	361	87.4	ns	[Not applicable]		[Not applicable]				
Condom use during vaginal intercourse with husband	56			406			.0011	[Not applicable]		[Not applicable]				
Always/most times		10	17.9		37	9.1								
Sometimes		19	33.9		82	20.2								
Ever		27	48.2		287	70.7								
Always/most times consume alcohol before sex with wife	[Not applicable]							56	15	26.8	406	153	37.7	ns
Ever had sex with male partner	[Not applicable]							56	2	3.6	379	18	4.7	^d ns

^a Chi square for trend^b Median (IQR)^c Wilcoxon rank sum test^d Fisher's exact test

Table 4

Characteristics and behaviors of truck drivers and their wives associated with practicing AI reported by truck drivers and their wives, Namakkal district, Tamil Nadu, India, 2010

Characteristics/behaviors	AI reported by truck drivers				AI reported by wives			
	Crude odds ratio (95% CI)	p value	Adjusted odds ratio (95% CI)	p value	Crude odds ratio (95% CI)	p value	Adjusted odds ratio (95% CI)	p value
<i>Truckers' characteristics/behaviors</i>								
Age (years)								
22–27	1.0 (0.5–1.8)	ns			3.1 (1.04–9.4)	.043		
28–37	1.7 (0.6–4.5)	ns			2.8 (1.4–5.6)	.003		
38–55	Ref.				Ref.			
Education								
≥ High school	2.7 (1.0–7.4)	0.054			4.0 (1.3–12.1)	.013		
Primary/middle school	1.8 (0.7–5.2)	ns			2.1 (0.7–6.5)	ns		
Illiterate	Ref.				Ref.			
Sexual debut before marriage								
Yes	1.9 (1.1–3.5)	.027	1.9 (1.0–3.4) ^a	.034	1.9 (1.1–3.6)	.033	1.9 (1.0–3.5) ^b	.05
No	Ref.				Ref.			
Felt at risk for HIV								
Yes					2.1 (1.03–4.4)	.041	2.5 (1.2–5.4) ^c	.015
No					Ref.			
Quality of sexual relationship								
Good/excellent	0.3 (0.1–1.0)	.058	0.7 (0.4–1.3) ^d	ns				
Bad/OK	Ref.							
Condom use during vaginal intercourse with wife								
Never	0.5 (0.2–1.3)	ns	0.5 (0.1–1.6) ^e	ns				
Sometimes	0.4 (0.1–1.2)	ns	1.7 (0.5–5.6) ^e	ns				
Always/most times	Ref.							
Had female sexual partner(s) other than wife								
Yes	1.9 (1.0–3.4)	.037	1.3 (0.7–2.6) ^f	ns				
No	Ref.							
Ever had sex with male or transgender								
Yes	3.8 (1.2–12.2)	.027	4.0 (1.2–13.3) ^g	.022				
No	Ref.							
Knew HIV can be prevented								
Yes	1.9 (0.7–5.0)	ns	1.4 (0.5–4.1) ^g	ns				
No	Ref.							

Characteristics/behaviors	AI reported by truck drivers				AI reported by wives			
	Crude odds ratio (95% CI)	p value	Adjusted odds ratio (95% CI)	p value	Crude odds ratio (95% CI)	p value	Adjusted odds ratio (95% CI)	p value
Wives' characteristics/behaviors								
Age (years)								
18–27					7.3 (1.6–32.8)	.009		
28–37					5.1 (1.2–22.9)	.031		
38–49					Ref.			
Education								
≥ High school					3.1 (1.4–6.8)	.005		
Primary/middle school					1.8 (0.8–4.1)	ns		
Illiterate					Ref.			
Condom use during vaginal intercourse with husband								
Never					0.4 (0.2–0.8)	.020	0.4 (0.1–1.1) ^h	ns
Sometimes					0.9 (0.4–2.2)	ns	1.02 (0.4–2.9) ^h	ns
Always/most times					Ref.			
Had male sexual partner(s) other than husband								
Yes					8.6 (4.3–17.4)	<.001	8.8 (3.2–24.0) ⁱ	<.001
No					Ref.			
Correct knowledge about HIV								
Yes					6.2 (2.7–14.6)	<.001	4.9 (1.9–12.5) ^j	.001
No					Ref.			
Knew HIV can be prevented								
Yes					3.3 (1.5–7.6)	.004	1.6 (0.6–4.1) ^k	ns
No					Ref.			
Sexual relationship control								
High					0.6 (0.2–2.2)	ns	0.8 (0.2–3.4) ^l	ns
Medium					0.6 (0.3–1.0)	ns	0.5 (0.2–1.3) ^l	ns
Low					Ref.			

^a Adjusted for age of truck driver

^b Adjusted for husband's age

^c Adjusted for husband's education status and correct knowledge about HIV

^d Adjusted for marital relationship attitudes of truck driver, female sexual partners other than wife, truck driver having sex with male/transgender

^e Adjusted for marital relationship attitudes of truck driver, female sexual partners other than wife, truck driver having sex with male/transgender, truck driver's knowledge that HIV can be prevented

^f Adjusted for marital relationship attitudes of truck driver, truck driver's knowledge about preventing HIV, truck driver having sex before marriage

^g Adjusted for age and education of truck driver

^h Adjusted for wife's age, correct knowledge about HIV, level of relationship control, having male sexual partner(s) other than husband, husband's correct knowledge about HIV

ⁱ Adjusted for wife's age, income, and correct knowledge about HIV

^j Adjusted for wife's age and education status

^k Adjusted for wife's age, education status, and correct knowledge about HIV

^l Adjusted for wife's age, education status, and income