

# A behavioral and serological survey of HIV infection among truck drivers and clients of female sex workers in Benin

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## ABSTRACT

**Background:** Between 2006 and 2012, the HIV rate in Benin remained stable at 1.2%, with some variation occurring between different segments of the population. It is known that truck drivers and clients of female sex workers (FSWs) are at higher risk for HIV infection. **Objectives:** This study seeks to better understand the changes in behavioral and serological indicators of HIV infection within these two social groups. **Materials and Methods:** We use descriptive and statistical methods to analyze cross-sectional data from gathered from all major population centers in Benin. Out of the 1400 commercial sex clients expected to enroll in the survey, 1008 participated, which represents an enrollment rate of 72%. In addition, 865 truck drivers participated in the study, which was carried out in 2015. Data were collected using an interview questionnaire and through blood samples. **Results:** Most truck drivers (80.2%) and clients of FSWs (88.0%) are Beninese and, for both groups, the average age was 29. The survey results also indicate that 12.1% of commercial sex clients and 8.8% of truckers had used drugs at least once in the past. In addition, 51.2% of clients of FSWs had recently been sexually active with multiple partners, and 43.4% had visited a FSW. In the case of truck drivers, 44.4% declared having recently had intercourse with multiple partners and 20.0% had paid for sex. In total, 79.5% of commercial sex users and 59.4% of truck drivers are well-informed about HIV/AIDS. Moreover, the survey data indicate that HIV rates in both groups dropped in comparison to 2012: HIV prevalence among clients of FSWs fell from 2.3% to 1.3% and, in the case of truck drivers, from 3.2% to 1.2%. **Conclusion:** The results of our study highlight the need to reinforce programs and communication strategies that aim to raise awareness among clients of FSWs and truck drivers about HIV prevention measures.


**KEYWORDS:** Behavioral and Serological Indicators; HIV/AIDS; Truck Drivers; Clients of Female Sex Workers

## INTRODUCTION

Despite the implementation of numerous prevention programs, HIV/AIDS remains a serious global public health

problem. According to the Joint United Nations Programme on HIV/AIDS,<sup>[1]</sup> 35 million people worldwide lived with HIV at the end of 2013. Sub-Saharan Africa has the highest number of infections: According to estimates, between 23.5 and 26.1 million in the region are HIV positive, representing roughly 7 out of 10 cases worldwide.

In 2011-2012, Benin implemented a demographic health survey in which people were screened for HIV and sexually transmitted diseases (STDs). Estimates from the survey results indicate that 1.2% of the population is HIV positive with

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women having a higher rate of infection (1.4%) compared to men (1.0%). Results from the 2<sup>nd</sup>-generation surveillance survey, implemented in 2012, indicate that the rate of HIV infection among clients of female sex worker (FSWs) and truck drivers was 2.3% and 3.2%, respectively.

Several behavioral surveillance surveys have been carried out in Benin by the PNLS. However, results from the 2012 survey indicate that despite targeted messaging, clients of FSWs and truckers are not well-informed about HIV and STDs and continue to engage in practices that increase the risk of infection.<sup>[2,3]</sup> Considering these past results, this study seeks to examine the evolution of behavioral and serological indicators related to HIV spread among truck driver and clients of FSWs. The analysis will help to evaluate the effectiveness of HIV prevention programs implemented over more than two decades.

## MATERIALS AND METHODS

Our study analyzes cross-sectional behavioral and serological data gathered from a survey that covered the main urban centers in Benin. A lengthy interview questionnaire was used to obtain information regarding behavioral practices. Blood samples were also collected from participants using clean and unused syringes, alcohol tampons, gloves, paper filters, and sealable plastic bags. The serological data obtained from these samples allowed us to estimate the rate of HIV prevalence within each group and to test for correlations between high-risk sexual practices, exposure to awareness messages, and HIV status. The results of the survey were also compared with those obtained from previous studies. In addition, we compared actual results to expected outcomes to evaluate the impact of policy measures that target groups vulnerable to HIV.

### Ethical Considerations and Administrative Provisions

The study was carried out after approval was obtained from the Ministry of Health through the Research Ethics Committee of the Institute of Biomedical Science and Applications. The committee studied and approved the research proposal in November 2015. Authorization was also obtained from the ministries of all 3 levels of education, the Interior Ministry and heads of civil society groups. Involvement in the study was voluntary, and participants could choose to opt out at any time. Those who enrolled were also asked to sign a written consent form.

### Population Surveyed and Sampling Procedure

Our sample frame was built using a map of prostitution sites<sup>[4]</sup> and a list of terminals for large trucks. Site surveys were carried in every department out along with semi-structured interviews with key informants (guides, bar

owners, hotel operators, directors of youth training centers) who helped locate areas of prostitution. Work sites included brothels and private rooms next to bars, hotels or motels. For each site, clients of FSWs were systematically recruited as they arrived until the number of participants required for the site in question was reached. In the case of truck drivers, we counted a total of 46 truck stops in Benin and mapped out their location. To gather data, we interviewed truckers who were present when the interviewer arrived or who came later and had not been interviewed by another member of the research team. Participants were recruited the moment they arrived on site.

Recruitment sites are generally divided into two strata (urban, rural). Within each stratum, the minimum sample size needed to detect an absolute change of 5%, 10% or 15% according to the indicators with confidence and power of 95% was determined by applying the relationships below. The initial values of the proportions are those from the ESDG 4.

$$n_i = D \frac{\left[ Z_{1-a} \sqrt{2P_i(1-P_i)} Z_{1-b} \sqrt{P_{1,i}(1-P_{1,i}) + P_{2,i}(1-P_{2,i})^2} \right]}{(P_{2,i} - P_{1,i})}$$

$$n = \text{Max}_{i=1}^k (n_i)$$

With:

$P_{1,i}$  = Estimate of initial proportion of indicator  $i$ .

$P_{2,i}$  = Proportion such that the difference  $P_{2,i} - P_{1,i}$  translates the desired sensed variation of the Indicator  $i$ .

$P_i = (P_{1,i} + P_{2,i})/2$ .

$Z_{1-a}$  = Z Score corresponding to the level of meaning desired, 95%.

$Z_{1-b}$  = Z Score corresponding to the power of the test.

$D$  = Cluster effect, 2.

$k$  = Number of indicators to be measured for which initial values of proportions are available.

$n_i$  = Desired sample size for indicator  $i$ .

$n$  = The recommended sample size for the  $k$  indicators considered.

### Behavioral Data

Data were collected using a questionnaire divided into sections. The interviews allowed the research team to gather data on the following modules: Information about the questionnaire and the interview; general information; sexual history (number and types of partners); sexual intercourse with FSWs; condom use; understanding of transmission modes and prevention measures for HIV/STDs; knowledge, opinions and attitudes about HIV/STDs and prevention strategies; exposure to awareness campaigns; adult screening for HIV; type of relationship (marriage, cohabitation) and sexual arrangement (regular or occasional partner).

## Health Data

Participants could decide whether they wished to be involved in both stages of the study (questionnaire and blood test) or only one part. Those who chose to only undergo a screening for HIV agreed to provide identification information along with their sample.

## Blood Sampling

Blood samples were taken and sent to the PNLs laboratory by qualified health workers (nurses, laboratory technicians). After the samples were cleaned, dry blood spot tests were carried using filtered paper. The spots were code labelled and dried using racks specifically designed for drying blotting paper. The samples were then individually packaged in sealable, desiccant plastic bags to protect them against humidity and conserved in a refrigerator between 2°C and 8°C.

## Screening Test

Blood samples were obtained on site by trained health workers, and the test results were given to participants who wished to know their serological status. As well, standard screening procedures were followed (pre-test consultation, sample removal and screening, post-test consultation and disclosure of results). After they were dried and placed in a bag, the samples were conserved at room temperature and then put in a refrigerator at + 4°C for the duration of the blood collection period. Afterward, they were transferred to the national reference laboratory, where they were kept at -20°C. Screening procedures were implemented in accordance with the 2<sup>nd</sup> strategic plan of the World Health Organization.<sup>[5]</sup> Specifically, sensitive tests were initially carried out followed by discriminant validity testing on samples that tested positive (a subject is declared to be HIV positive when the results of both tests are positive). In the laboratory, technicians applied an initial test using murex and followed up, when necessary, with immunocomb, a fast-acting discriminant validity test.

## Statistical Analysis

The behavioral and serological data collected were entered into EPIDATA 3.1, and any inconsistencies or errors during data entry were analyzed and corrected. SPSS 21.0 was then used to carry out univariate and multivariate analysis. Both the Pearson Chi-square test and the Fisher test were applied using a significance level of 5%. Changes in behavioral and serological indicators were analyzed by comparing the results obtained with those from previous 2<sup>nd</sup> generation surveillance surveys. We also carried out a logistic regression to account for how behavioral factors might influence the spread of HIV.

## RESULTS

### Sociodemographic Characteristics of Commercial Sex Clients

On average, clients of FSWs were 29.4 years old (range: 15-70 years) (Table 1). Those who were 25-34 were more likely to have visited FSWs (47.4%) and 77.2% of clients were under the age of 34. More than a quarter (29.8%) of respondents were in the 15-24 age bracket and most (87.0%) had completed at least some schooling. More than half of the clients surveyed (56.6%) had finished at least their secondary education. In terms of religious affiliation, two-thirds of respondents (66.6%) were Christian and 20.7% were Muslim. As well, most respondents were from Benin (88.0%), followed by Nigeria (3.8%), Togo (3.2%), and Ghana (1.6%).

In terms of marital status, almost half of commercial sex clients (48.1%) were single. Respondents were mostly artists/artisans (31.2%), traders (21.3%), truckers/drivers/taxi drivers (16.5%), or students (15.2%). Most respondents (88.6%) said they consumed alcohol and roughly 50% of those who did consume more than 3 drinks per day. However, a majority of the clients surveyed do not smoke (70.2%) or use drugs (87.9%).

### Sexual History of Commercial Sex Clients

On average, respondents were 16.7 years old when they began to have sexual intercourse and were 21.3 when they first visited a FSW. Moreover, 90.3% of commercial sex clients have used a condom at least once and on average respondents first used one at the age of 20.6 (range: 15-45 years). During the three months before the survey, clients of FSWs said they had sex with a regular partner (98.5%) occasional (non-commercial) partners (51.2%) and FSWs (43.4%). Respondents on average had 4.9 female sex partners, of which 2.3 were occasional partners. In addition, 89.7% of clients were sexually active in the 7 days before the survey and 31.8% had intercourse with occasional partners. During this time period, respondents had sex with 2.2 different partners including 1.7 occasional partners.

### Length of Involvement, Prices and Violence toward FSWs

Respondents on average had been visiting FSWs for 7.7 years. However, almost seven out of 10 clients surveyed (65.0%) had been commercial sex users for a shorter period. Among this group, 47.5% are 25-34 years old and 38.6% are in the 15-24 age bracket. In addition, the percentage who have a secondary and primary school education is 44.8% and 29.1%, respectively. In terms of marital status, 55.8% are single and 20.3% are in a monogamous relationship. The average price for commercial sex was 1858 CFA francs (3 USD), with the

highest amount paid being 15,000 CFA francs (24.22 USD). It is noteworthy that 34.8% of clients paid 1000 CFA francs (1.61 USD) and that 79.2% paid the average price or less. Among those who paid less than the average amount, 46.1% were 25-34 years old, 30.2% were 15-24, 42.9% had completed their secondary education, and 32.2% had a primary-level education. In terms of abuse, 29.1% of respondents said they

had witnessed violence against a FSW. The most common form of violence witnessed was physical (13.9%), followed by psychological abuse (11.4%) and sexual violence (3.8%). All age groups witnessed similar types of violence, except for those 35-44 years old, who were more likely to have observed psychological abuse (47.2%) than physical violence (41.7%).

### Condom Access, Availability and Usage

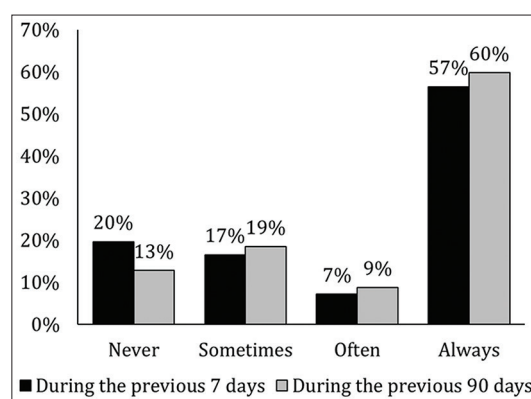
In total, 86.8% of respondents can find condoms easily, 10.4% said that it was relatively easy, and 1.3% said it was difficult.

### Condom Use among Commercial Sex Clients

Condom use among respondents varies according to the type of sexual partner (Figure 1). The number of clients who always used condoms with FSWs during the 7 days and the 3 months before the survey was 56.5% (518/917) and 59.8% (569/951), respectively. An additional 7.2% and 8.8%, respectively, declared using a condom often, followed by 16.6% and 18.5% who said they sometimes wore one. By contrast, the proportion of respondents who said they never used a condom during each time frame was 19.7% and 12.8%, respectively. In 44.7% of cases ( $n = 766$ ), the client chose to wear a condom. The decision was taken by the partner 36.7% of the time and in 18.6% of cases the decision was mutual.

### Condom Use with Spouse

During the 3 months preceding the survey, roughly half of clients who were married (50.2%) declared having never used a condom with their spouse. As well, 44.4% of married respondents used a condom during their last sexual encounter versus 55.6% who did not use one. In 66.4% of cases, it is the client who took the decision to wear a condom. The partner made the decision in 18.2% of cases and 15.5% of the time; the decision was taken mutually. The respondents said they chose to wear a condom to prevent STDs (69.6%), to prevent



**Figure 1:** Frequency of condom use by clients of female sex workers. Sometimes: 1-4 times out of 10; Often: 5-9 times out of 10; Always: 10 times out of 10

**Table 1:** Distribution of commercial sex clients according to marital status, profession and alcohol/drug consumption

Characteristics	n (%)
Marital status (n=987)	
Single (does not have a female partner)	475 (48.1)
Monogamous marriage (lives with a spouse)	153 (15.5)
Polygamous marriage (lives with several spouses)	241 (24.4)
Divorced/widowed/separated (has no female partner)	72 (7.3)
Divorced/widowed/separated (has one or several female partners)	30 (3.0)
Other	16 (1.6)
Profession (n=993)	
Trader	214 (21.3)
Driver, trucker, taxi driver	165 (16.5)
Farmer	32 (3.2)
Fisherman	5 (0.5)
Student	152 (15.2)
Trainee/Apprentice	43 (4.3)
Artisan/Artist	313 (31.2)
Other	79 (7.9)
Alcohol consumption (n=994)	
Daily	252 (25.4)
Several times a week	239 (24.0)
Once a week	133 (13.4)
Less than once a week	31 (3.1)
Occasionally	226 (22.7)
Never	113 (11.4)
Tobacco use (n=996)	
Never	699 (70.2)
Rarely (less than once a week)	115 (11.5)
Occasionally (5-10 cigarettes weekly)	90 (9.0)
Daily but <10 cigarettes a day	73 (7.3)
Often (10 cigarettes or more daily)	19 (1.9)
Drug use (n=994)	
Never	874 (87.9)
Rarely (less than once a week)	60 (6.0)
Often (5 times a week)	34 (3.4)
Every day	26 (2.6)
Use of injectable drugs (n=994)	
Never	975 (98.5)
Rarely (less than once per week)	12 (1.2)
Often (5 times a week)	2 (0.2)
Every day	1 (0.1)



a pregnancy (45.5%), for medical reasons (2.7%), to test its use (1.8%) or for other reasons (7.1%).

### Condom Use with Regular Partner

In total, 26.6% of clients said they never used a condom with their regular (non-married) partner during the 3 months before the interview. In contrast, 31.6% always wore one. Some of the clients surveyed said they used a condom often (12.7%) or occasionally (26.6%). Less than half of respondent (43.2%) wore a condom the last time they had sex with their regular partner compared to 56.8% who did not. The decision to wear a condom was made by the client 70.5% of the time. In 17.0% of cases, the partner took the decision and 12.5% of the time the decision was mutual.

### Condom Use with Occasional Partners

Roughly a quarter (25.2%) of respondents said they never used a condom with their occasional partner(s) during the previous 3 months versus 42% who always wore one. Almost two-thirds (65.6%) of clients used a condom during their most recent sexual encounter with an occasional partner. On the other hand, 34.8% chose not to use one. In 74.6% of cases, the client said they chose to wear a condom; the decision was taken by the partner 14.1% of the time and in 11.3% of cases a joint decision was made.

### Reasons for not Wearing a Condoms

Clients of FWSs gave several reasons as to why they chose not to wear a condom (Table 2). The answers given vary according to the type of sexual partner. It is noteworthy that one of the most frequent reasons that were invoked was “to increase sexual arousal.” This was mentioned as a reason in

43.3% of cases involving a spouse and in 21.3% of cases involving a regular or occasional partner. Other reasons that were cited included “i dislike the use of condoms,” “i trust my partner,” “it was unnecessary,” and “there was no condom in the room.”

### Condom Tearing and the Use of Lubricants

Among those surveyed, 37.3% said they tore a condom or had to remove one during intercourse. More than one out of 5 clients (23.1%) used a product to facilitate intercourse. The products that were most often used included lubricating gel (63.3%), vaseline (4.6%), glycerin (5.0%), and honey (2.8%).

### Awareness about STDs and HIV

Among the clients of FSWs that were surveyed, 17.6% said they contracted STDs in the 12 months before the survey. Among this group, 76.7% had ulcer complications or genital bumps and 57.0% suffered from urethral discharge. Half of them (50.0%) suffered one outbreak of symptoms, although some experienced 2 episodes (25.2%), 3 episodes (10.7%), 4 episodes (5.1%), or even 5 or more outbreaks (8.9%). It should be noted that 31.1% of client who contracted an STD did not take any precaution to avoid contaminating their sexual partner during the onset of symptoms, while 37.8% practiced abstinence and 23.0% wore a condom.

### Access to Health Care Treatment for STDs

The survey data indicate that 18.4% of commercial sex clients did not treat their STD, 19.3% self-treated the infection, 23.9% visited a public health center, and 12.7% consulted a private health clinic. In addition, 13.9% of respondents visited a street vendor or a market that sold drugs and 7.9%

**Table 2:** Reasons given by clients of FSWs for not using a condom according to the type of partner

Reason given	Type of partner (%)			
	FSW	Spouse	Regular partner	Occasional partner
There was no condom in the room	3.8	4.5	4.2	7.4
Condoms were not available in the store	1.7	0.0	1.6	2.7
Condoms were too expensive	1.7	1.5	1.1	1.6
Partner refused to wear one	10.3	7.5	5.3	4.8
Partner agreed to forego condom in exchange for money	6.4	1.5	2.4	5.3
To increase sexual arousal	17.9	43.3	21.3	21.3
I dislike the use of condoms	23.9	4.5	12.4	22.3
Another type of contraception was used	1.3	4.5	2.9	2.7
It was unnecessary	7.3	7.5	11.3	8.0
I trust my partner	10.3	9.0	23.4	11.2
We were alcohol impaired	1.3	6.0	3.2	3.2
We were trying to get pregnant	0.9	4.5	4.2	2.1
We did not think to use one	2.6	3.0	2.4	3.2
Other reason	10.7	3.0	4.5	4.3

FSW: Female sex worker

bought medicine in a pharmacy. Among those who sought treatment, only 27.5% treated their female partner as well.

### Awareness and Misconceptions about HIV/AIDS

In total, 84.3% of clients were aware that HIV can transfer from mother to child and 90.4% knew that the virus could be transmitted through unprotected sex. Regarding prevention measures, most clients understood that condoms can prevent the spread of STDs (89.5%) and HIV (89.4%).

Table 3 shows certain misconceptions about HIV/AIDS among clients of FSWs. The belief that HIV can spread through mosquito bites was the most widely held misconception (38.3%), followed by the view that transmission can occur by sharing food with an infected individual (24.7%) and the notion that a person who appears in good health cannot have HIV (9.8%).

A composite indicator was created to measure how much clients knew about HIV. We evaluated the extent of their knowledge regarding HIV prevention measures and whether they believed certain misconceptions. The results show that 79.5% of respondents were well-informed about HIV/AIDS. Age does not appear to be a factor: The percentage of those under and over 25 who correctly understood the disease was not noticeably different (80.9% versus 79.0%). However, the percentage is lower among those who are illiterate (66.7%) or who did not attend school (71.1%). Those with post-secondary education had the highest proportion of knowledgeable respondents (88.5%).

### HIV Prevalence and the Impact of Interventions

In total, 95.0% of commercial sex clients agreed to undergo screening for HIV and 99.4% received voluntary counselling. Blood samples were taken from 92.7% of study participants. Among the 934 respondents who agreed to be screened, 12 tested positive for HIV-1. We, therefore, estimate that the rate of HIV prevalence among clients of FSWs is 1.3% with a 95% confidence interval estimate between 0.6% and 2.1%. The result indicates that the HIV rate has fallen in comparison to the estimate (2.3%) from 2012.

In total, 71.0% of clients attended a demonstration on correct condom use and 60.0% heard or read a message

about STDs during the previous 6 months. The information sources most widely cited were the radio (68.0%), television (46.9%), non-governmental organization (38.4%), health workers (20.9%) and videos projected during information, education and communication sessions (7.4%). Furthermore, 50.8% said they had been advised to visit a health center if they contracted an STD. Half of respondents (50.0%) had already previously undergone a screening for HIV and 93.9% of those who did had obtained their results.

### Determinants of High-Risk Sexual Behavior by Clients of FSWs

Table 4 presents the variables associated with condom use among clients of FSWs during the 7 days before the survey. Among the respondents who used protection during intercourse with a FSW, 88.1% said that finding a condom was easy. In comparison, 83.2% of those who did not use a condom said that they were easy to find. The difference however between both groups was not statistically significant. Moreover, 46.3% of those who used a condom previously underwent a screening for HIV and obtained their results. The percentage was lower among those who had unprotected sex (42.5%), although again the difference was not significant.

Age and marital status do not influence the decision to wear a condom during intercourse with FSWs. However, exposure to HIV and STD-related messages is positively correlated with condom use ( $P < 0.05$ ). In total, 62.0% of clients who read or heard an awareness message wore a condom, compared to 54.1% among those who did not. This result suggests that public awareness messages targeting vulnerable groups encourage condom use.

Table 5 shows that the factors associated with the use of condoms by clients of FSWs during their last sexual encounter. Variables such as condom availability, having previously undergone a screening and obtained the results, age and marital status did not have a noticeable effect on condom use. However, clients who were exposed to public awareness messages were more likely to wear a condom (61.8%) compared to others (51.7%), and the difference was statistically significant.

**Table 3:** Misconceptions regarding HIV/AIDS among clients of FSWs

HIV-related questions	Response indicating misconception	Total number of respondents	% who provided erroneous answer	95% confidence interval
Can a person get HIV through mosquito bites?	Yes	966	38.3	38.2-38.4
Can a person get HIV by sharing food with someone who is HIV positive?	Yes	966	24.7	24.6-24.8
Can a person who appears healthy in fact be infected with HIV?	No	962	9.8	9.7-9.9

FSW: Female sex worker

**Table 4:** Determinants of condom use among clients of clients of FSWs during the 7 days before the survey

Behavioral indicators	Respondent used a condom with a FSW during the preceding 7 days (%)		P value
	No	Yes	
Condom availability			
It is easy for the respondent to find and purchase a condom	83.2	88.1	0.061
HIV testing			
Respondent underwent screening and obtained the results	42.5	46.3	0.326
Socio-demographic characteristics			
15-24 years old	32.3	28.4	0.261
25-34 years old	44.8	48.8	0.295
Married	45.7	47.9	0.577
Exposure to awareness campaigns			
Respondent heard or read a public-awareness message regarding STDs or HIV/AIDS	54.1	62.0	0.036*

\*5% significance level, FSW: Female sex worker, STDs: Sexually transmitted diseases

**Table 5:** Determinants of condom use among clients of FSWs during their most recent sexual encounter

Determinants	Respondent used a condom during their last sexual encounter (%)		P value
	No	Yes	
Condom availability			
It is easy for the respondent to find and purchase condoms	84.1	87.8	0.162
Prevention/surveillance			
Respondent underwent a screening and obtained the results	43.6	45.5	0.635
Socio-demographic characteristics			
15-24 years old	32.2	28.8	0.337
Married	46.7	47.2	0.913
Exposure to awareness campaigns			
Respondent heard or read a message regarding STDs and HIV/AIDS	51.7	61.8	0.009*

\*5% significance level, FSWs: Female sex workers, STDs: Sexually transmitted diseases

### Sociodemographic Characteristics of Truck Drivers

The survey aimed to enrol 1000 truck drivers in Benin. In the end, 865 truckers agreed to participate, representing an enrollment rate of 86.5%. More than half of respondents (56.6%) were from the Plateau and Atlantic departments. The average age was 29 (range: 12-84) and 66.8% of those surveyed were 20-34. Roughly one out of 10 drivers were between the ages of 15 and 24. Most respondents (75.45%) had completed their primary or secondary education and one out of 5 did not have any schooling. In terms of religious affiliation, more than half of respondents were Muslim (57.2%) and 37.7% were Christian. As well, a majority of respondents were from Benin (80.2%) or Nigeria (11.7%).

The results show that 53.8% of surveyed drivers are married and 46.2% are single (Table 6). In addition, 60.3% owned their own trucks and 38.4% were in training. The median number of years that respondents had been in the business was 7 and the maximum length was 50 years. More than half of respondents (57.8%) had been truck drivers for 5 years or

less; 21.5% had been driving for between 6 and 10 years and 20.8% had been doing so for more than 10 years. On average, truck owners hired 1.7 new trainees over the course of the previous 12 months, and the maximum number hired was 12. In total, 47.0% of respondents said they were often absent from home (5-9 times out of 10) during the 12 months before the interview and 42.0% said that they were sometimes absent (1-4 times out of 10). The highways that are most often used are Benin-Niger (44.6%), Benin-Nigeria (27.0%), Benin-Burkina (14.5%), and Benin-Benin (10.7%).

A majority of truck drivers (63.0%) were exposed to public awareness messages regarding HIV with the information sources most commonly cited being the radio television (58%) and newspapers (9%). However, few respondents said they regularly listen to the radio (13.0%), watch television (5%), or read the newspaper (1.0%). Almost a quarter (24.0%) of truck drivers declared having a visited a health center during the previous 12 months. Respondents said the reason for the visit was for a checkup (70.1%), for health matters unrelated

to STDs (20.8%) or to get counselling for an STD (9.1%). More than half (53.8%) of drivers surveyed had consumed alcohol, 28.0% had used tobacco, and 8.8% had taken drugs. Among those who had consumed drugs, 13.7% had used an injectable form.

### Sexual History of Truck Drivers

More than half (53.3%) of respondents were currently married or lived with a female partner at the time of the survey. The average number of partners per driver was 1.4 (max: 12), of whom 1.2 lived in the same house as the respondent (max: 4) the average age of respondents at the time of marriage was 23.1 and the median age at which drivers had their 1<sup>st</sup> sexual encounter was 17.8 (range: 10-36 years). In total, 51.3% of truck drivers ( $n = 809$ ) said they had sexual intercourse with a partner other than their spouse. The practice is more pronounced among young respondents between 15 and 34 (57.6%) those who are single (53.7%), those who practice a traditional religion (57.1%), Christians (53.3%) and drivers with a primary-level education. On average, respondents were sexually active with 2 different partners.

Sexual activities during the 3 months before the survey varied according to the type of partner (Table 7). In total, 68.9% ( $n = 853$ ) of those surveyed had sexual intercourse. The percentage was higher among those 25-49 years old,

**Table 6:** Distribution of truck drivers according to marital status, occupational status, and length of practice

Characteristics	<i>n</i> (%)
Marital status ( $n=859$ )	
Married	462 (53.8)
Single	397 (46.2)
Occupational status ( $n=856$ )	
Owner	516 (60.3)
Trainee	329 (38.4)
Other	11 (1.3)
Number of years as a truck driver ( $n=833$ )	
<1 year	8 (1.0)
1-5 years	473 (56.8)
6-10 years	179 (21.5)
>10 years	173 (20.8)

**Table 7:** Breakdown of sexual activities among truck drivers according to type of partner

Type of partner	Yes	No
Sexual intercourse regardless of partner type ( $n=853$ )	68.9	31.1
Sex with regular partner ( $n=544$ )	82.5	17.5
Non-commercial sex with occasional partner ( $n=554$ )	44.4	65.6
FSW only ( $n=551$ )	20	80
Male partner (homosexual relationship) ( $n=579$ )	0.3	99.7

FSW: Female sex worker

especially in the 30-34 age group (84.1%). In addition, those with a primary-level education (73.1%) and truckers from Ghana (85.7%) were more likely to have been sexually active.

Among the drivers surveyed, 53.2% had intercourse with someone other than their spouse during the previous 3 months (Figure 2). The percentage engaging in non-marital sex decreased with age, declining from 74.5% among those 15-19 years old to 40.7% among respondents who were 40 and older. Single drivers were also more likely than married ones to engage in high-risk sexual practices (92.1% versus 60.1%).

### Condom Availability

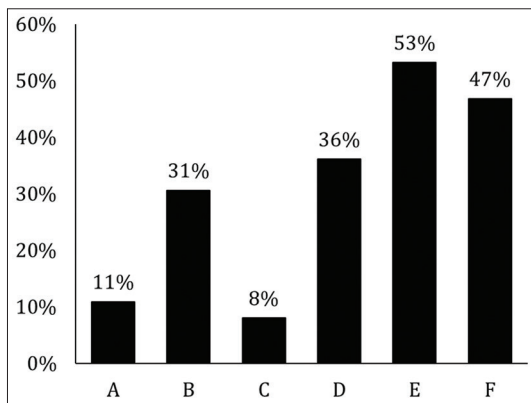
Most truckers (95.1%) said that they know a location where they can find condoms. Roughly one out of 4 respondents (26.3%) can walk to a place that sells condoms in <5 min (Figure 3). In total, 71.7% of truck drivers said that it takes them 15 min or less on foot to find condoms. In comparison, the corresponding percentage was 82.9% in 2012 and 75.3% in 2008. All those surveyed from the departments of Collines, Couffo, and Alibori were within a 15 min walking distance from a point of sale. The corresponding percentage was also high in the departments of Donga (98.0%) and Borgou (86.0%) but lower in Ouémé (67.1%), Plateau (66.2%), and Atlantique (51.4%). Condoms were purchased in pharmacies (71.2%), stores (68.3%), retail shops that sold the Prudence Plus condom brand (66.4%), kiosks (60.2%), supermarkets (55.7%), and markets (50.4%). The results underscore the need to redirect and strengthen measures to help truck drivers access condoms.

Among the truck drivers surveyed, 21.5% ( $n = 767$ ) had used a condom at least once and 29.6% ( $n = 581$ ) wore one the last time they had intercourse (the percentage in 2012 was 32.6%). The results show that the choice to wear a condom is not influenced by religious affiliation. However, its use does vary by level of education and nationality. Truckers from Ghana were more likely to use protection. In addition, respondents in the 15-24 age group wore condoms twice as often as those who were 40 and older (48.0% versus 22.9%).

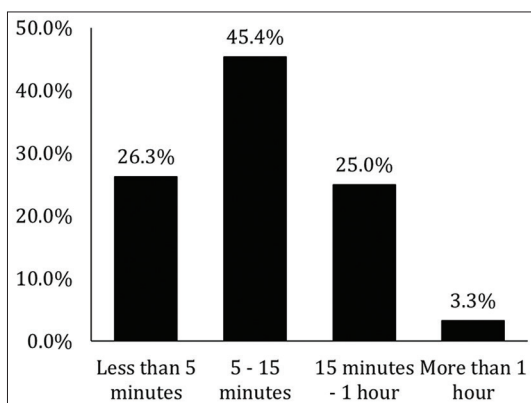
Condom use also varies according to the type of sexual partner. Among the 84.4% ( $n = 532$ ) of truckers surveyed who had sex with a regular partner, 19.5% ( $n = 414$ ) used protection during the last sexual encounter. As well, 64.6% of those who had worn a condom had done so during the 7 days before the survey. Most respondents (98.7%) said they used a condom during the previous 30 days. However, usage varies: 46.3% said they wore one sometimes, 32.5% used one often, and 20.0% always wore one.

Roughly 6 truck drivers out of 10 ( $n = 194$ ) said they used protection the last time they had non-commercial sex with an occasional partner. Among this group, 55.1% always





**Figure 2:** Distribution of truck drivers based on sexual activities during the 3 months before the survey ( $n = 947$ ). A - Sex with female sex worker (FSW) or with occasional (non-commercial) partner, B - Sex with occasional (non-commercial) partner only, C - Sex with FSW only, D - Regular sex with non-married partner, E - Respondent engaged in at least one high-risk activity, F - Respondent did not engage in any high-risk activities



**Figure 3:** Time required by truck drivers to obtain condoms

wore a condom during sex in the 7 days before the survey. However, only 34.5% of all truck drivers surveyed said they always wore one, whereas 27.4% used one often and 35.4% sometimes used one.

In total, 58.3% of truck drivers used a condom the last time they had sex with a FSW. Within this group, 57.1% had used a condom during the previous 7 days. On the other hand, the percentage of total respondents who claimed to always use a condom of was lower (42.6%). In addition, 21.3% said they often wore one and 36.2% said they used one occasionally.

Respondents said they used condoms to prevent the transmission of HIV/AIDS (89.5%) and to avoid unwanted pregnancy (53.8%). These results suggest that truck drivers are aware of the benefits of condoms even if they do not always use them.

### Awareness of STDs and HIV among Truck Drivers

The results of the survey indicate that 78.2% of truckers are aware that diseases can spread through unprotected sex and

9.8% said they had contracted an STD during the 12 months before the survey. The corresponding percentages for 2012 were 77.6% and 11.0%, respectively. Among those who contracted an STD, 4.3% suffered from ulcer complications or had bumps on their genitals and 7.8% experienced urethral discharge. More than half (57.2%) of truck drivers can identify at least 2 symptoms of STD in women although the percentage rises slightly among drivers who are 35 and older. In total, 73.2% of respondents can identify at least 2 kinds of symptoms of STD in men. 3 out of 4 (75.7%) drivers surveyed who were 25 and older are aware of at least 2 STD symptoms in men and among drivers in polygamous relationships the percentage is 79.8%.

Among those who contracted an STD, 36.3% did not seek treatment, 35.0% practiced abstinence, 16.3% used a condom, and 74.7% sought counseling therapy. Half (49.4%) of respondents who sought treatment went to a health center (28.6% public and 20.8% private), 23.4% consulted with family and friends and 18.2% turned to traditional healers. Two-thirds (67.8%) of those who visited a health center received a prescription, of whom 87.5% purchased all the required medications. A small percentage (2.5%) already had the medicine, 5.0% only bought some of the medication prescribed and 2.5% did not purchase anything. While 84.6% of those who were given a prescription took the medicine, 15.4% did not use or purchase them either because of cost reasons or because they were unavailable.

Awareness about HIV among truck drivers improved slightly compared to 2012. Most truck drivers (94.2%) have heard about HIV/AIDS, compared to 93.5% in 2012 and 18.1% knew someone who has HIV/AIDS or who died from it (the percentage in 2012 was 22.1%). It is noteworthy that most drivers surveyed knew that the virus can be transmitted through used needles (93.2%) or by using the same toothbrush as an individual who is HIV positive (85.9%). In terms of prevention measures, 85.9% of respondents were aware that condoms can prevent HIV.

The survey results show that 8.7% of truckers correctly identified three prevention measures, compared to 48.0% in 2012. This proportion is significantly lower than the percentage of respondents who have heard about HIV (94.2%). We considered respondents to have a good working knowledge of HIV if they knew how to prevent infection and if they rejected certain misconceptions about the how the virus is transmitted. The analysis shows that 59.4% of drivers (513/865) are well-informed about HIV, compared to 35.5% (306/859) in 2012 ( $P < 0.001$ ).

Some truckers continue to believe certain false ideas about HIV/AIDS (Table 8). For example, one out of three respondents (33.0%) believed that HIV can be transmitted through mosquito bites, although in 2012 the percentage was 25.2%. In addition, 33.0% said that sharing food with an

**Table 8:** Misconceptions about HIV/AIDS among truck drivers

HIV-related questions	Response indicating misconception	Total number of respondents	% who provided erroneous answer	95% confidence interval
Can a person get HIV through mosquito bites?	Yes	799	33.0	32.8-33.1
Can a person get HIV by sharing food with someone who is HIV positive?	Yes	798	33.0	32.8-33.1
Can a person who appears healthy in fact be infected with HIV?	No	797	16.1	16.0-16.2

infected individual can lead to the spread of HIV. Moreover, 16.1% of truckers surveyed think that individuals who appear healthy cannot be HIV positive.

**Clinical Screening of Truck Drivers**

Truck drivers must undergo a screening test for HIV to know their serological status. Most respondents (61.0%) have a screening center in their area that they can visit and 43.7% had already undergone the test at the time of the survey (compared to 41.0% in 2012). More than half (58.4%) of those who took the test did so in the previous 12 months, of whom 40.5% underwent one screening and 6.5% did it twice. Nine out of 10 truck drivers (90.7%) underwent voluntary testing, and most said they took the test to know their serological status. Among those who did a blood test, 89.4% obtained their results. A lack of time (56.6%), fear of getting a positive result (16.7%) and forgetting to follow-up (13.3%) were cited as reasons for not having obtained the results. Half (50.0%) of truck drivers did not share their results with a third party, and 1.9% were declared HIV positive before the survey.

**Exposure to Awareness Campaigns**

During the 6 months before the survey, 37.8% of respondents heard, saw, or listened to messages about HIV and STDs. By contrast, in 2012, the percentage was 51.0%. Information sources included radio (70.0%), television (53.7%), health workers (30.0%), exchanges at truck stops (49.5%), and close relatives (35.6%).

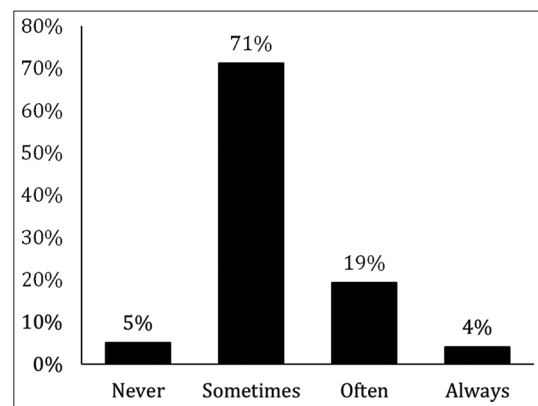
Figure 4 shows how often truck drivers are exposed to awareness messages about STDs and HIV. Most respondents (71.2%) said they received messages occasionally, while some received them often (19.3%) or always (4.1%). However, 4% of surveyed truckers had never been exposed to an HIV or STD-related message.

As Table 9 shows, the truck drivers surveyed received information on a variety of STD-related subjects. The 5 main topic areas addressed included STD prevention measures (80.4%), the modes HIV transmission (72.4%), the correct use of condoms (62.5%), the modes of STD transmission (59.3%), and HIV prevention measures (53.8%).

**Table 9:** Content of public awareness messages read or heard by truck drivers

Message content	Percentage
HIV prevention measures	53.8
Modes of HIV transmission	72.4
STD prevention measures	80.4
STD transmission's ways	59.3
Correct use of condoms	62.5
Quality and effectiveness of condoms	37.1
Places where condoms can be purchased	18.5
Health centers offering treatment for STDs	11.6
Treatment for STDs other than HIV/AIDS	13.8
The danger of leaving STDs untreated	19.6
HIV/AIDS treatment options	13.5

STDs: Sexually transmitted diseases



**Figure 4:** Degree to which truckers hear or read messages regarding sexually transmitted disease or HIV. Sometimes: 1-4 times out of 10; Often: 5-9 times out of 10; always: 10 times out of 10

**Evaluating the Impact of Awareness Activities**

The behavioral practices of truck drivers are potentially influenced by the information they receive on STDs and HIV delivered through various sources (radio, television, informal exchanges at truck stops). We analyzed the possibility using a three-step scale that measures a truck driver's level of exposure to HIV and STD-related messaging during the 6 months before the survey. Table 10 presents the results that awareness messages had on sexual practices.

The results show that prevention efforts have an impact on the sexual behavior of truck drivers. Respondents with a high

**Table 10:** Evaluating the impact of HIV/AIDS awareness messages

Content of messages	Level of exposure to messages about HIV and STDs			
	High	Medium	None	P value
<b>Sexual history</b>				
Had intercourse with an occasional (noncommercial) partner during the previous 3 months	33.0	38.5	51.7	0.001*
Had intercourse with a FSW during the previous 3 months	19.1	16.4	21.8	0.45
Engaged in a high-risk sexual activity during the previous 3 months	39.7	60.6	69.0	0.000*
Had unprotected sex with a high-risk partner	21.5	17.6	25.2	0.20
Used a condom during intercourse with an occasional partner	61.1	57.1	52.5	0.37
Used a condom during the most recent sexual encounter with a high-risk partner	18.9	11.1	11.8	0.01*
Always used a condom with high-risk sexual partners during the previous 30 days	4.1	5.7	5.8	0.68
<b>Prevention/treatment</b>				
Knows the location of a screening center	66.5	70.3	54.5	0.000*
Received free condoms	65.5	67.1	58.2	0.05*
Underwent HIV screening	50.0	37.9	43.2	0.07
<b>Knowledge of STDs and HIV/AIDS</b>				
Knows at least three HIV prevention measures	31.4	28.9	27.4	0.62
Knows at least three modes of HIV transmission	82.9	88.5	86.7	0.30
Has a good understanding of AIDS	25.6	18.5	14.7	0.004*
Knows that abstinence reduces the risk of HIV/AIDS	26.9	29.5	15.3	0.000*
Knows that spousal fidelity reduces the risk of HIV/AIDS	37.4	34.3	30.7	0.26
Knows that reducing the number of sexual partners lowers the risk of HIV/AIDS	30.8	20.9	30.0	0.08
Knows that condoms reduce the risk of HIV/AIDS	88.0	93.0	88.0	0.11
<b>Threats/risk perception</b>				
Knows someone who has HIV/AIDS or who died from it	25.6	18.5	14.7	0.004*

\*5% significance level, STDs: Sexually transmitted diseases, FSW: Female sex workers

level of exposure to HIV and STD-related messaging were less likely to have sex with an occasional (noncommercial) partner than those with no exposure (51.7% versus 33.0%). As well, 69.0% of truckers who were not reached through awareness messages engaged in high-risk sexual behavior, whereas 39.7% of respondents with frequent levels of exposure did so.

HIV and STD-related messaging was also positively correlated condom use during the last sexual encounter: 18.9% of truck drivers who were frequently reached by awareness messages wore a condom, compared to 11.8% among those with no exposure. Moreover, those who were often exposed to messaging were more likely to know that abstinence reduces the risk of HIV transmission. Truck drivers in this category were also better informed about AIDS (25.6%) compared to those with a medium (18.5%) and low level (14.7%) of exposure. It is possible to conclude therefore that knowledge, attitudes and practices among truck drivers are influenced by educational messages about STDs and HIV/AIDS. The results highlight the need to reinforce measures that encourage HIV prevention among truck drivers.

### HIV Prevalence among Truck Drivers

In total, 92.3% of truck drivers surveyed agreed to undergo a screening for HIV, and 98.8% of them received counselling. Of the 750 truckers who underwent a screening, 9 tested positive for HIV-1. As such, the estimated rate of HIV prevalence is 1.2% with a 95% confidence interval estimate between 0.5% and 2.0%. The rate of infection declined from 2012 when it was 3.2%. Moreover, the blood tests did not isolate any strain of HIV-2.

HIV affected the 20-34 age group and was especially pronounced among those 20-24 (1.8%). Drivers who have been in the business for <1 year were also more likely to be infected (12.5%). This suggests that younger truck drivers are more sexually active than older ones.

### Determinants of High-Risk Behavior among Truck Drivers

Having intercourse with occasional partners or FSWs constitutes high-risk behavior. To measure the degree of risk taking, we considered whether truck drivers used a condom the last time they had sex with a high-risk partner during

the 3 months before the survey. Table 11 shows whether the decision by truck drivers to wear a condom was influenced by certain factors.

The results suggest that receiving free condoms, previously undergoing a screening (knowing one's serological status), knowledge of three modes of HIV transmission, and awareness of the importance of using condoms correctly are positively correlated with condom use. Furthermore, the decision to wear a condom during intercourse with a high-risk partner is influenced by whether the respondent is from Benin, alcohol consumption and the respondent's level of exposure to health-related messages delivered through the radio. However, variables such as age, level of education and marital status did not have any noticeable effect.

## DISCUSSION

The aim of this study was to gather behavioral and serological data from truck drivers and clients of FSWs in Benin. This allowed us to compare our data with the results from previous 2<sup>nd</sup> generation surveillance surveys conducted in Benin, particularly the one from 2012. As such, we were able to evaluate the impact of prevention programs that have been implemented now for several years. The results indicate that the rate of HIV infection among truck drivers in 2015 was

1.2% compared to 3.2% in 2012. In addition, HIV prevalence among clients of FSWs also declined, falling from 2.3% in 2012 to 1.3% in 2015. This suggests that HIV rates in both groups have been converging toward the prevalence rate within the general population of Benin, which is 1.2%.<sup>[6]</sup>

However, certain groups had higher rates of HIV infection, such as prison inmates (1.4%), men in homosexual relationships (6.7%), injectable drug users and FSWs (15.6%).<sup>[7]</sup> Furthermore, HIV rates obtained from studies conducted in West Africa among truck drivers and clients of FSWs differed from those found in our survey. HIV prevalence among truckers in Guinea dropped from 7.0% in 2001 to 5.3% in 2007 and, in Senegal, from 1.4% in 2006 to 0.6% in 2010.<sup>[8]</sup> HIV prevalence among clients of FSWs was found to be the highest in Togo (2.5%) where the infection rate also varied strongly according to age.<sup>[9]</sup> Infection rates among truck drivers and clients of FSWs differ between countries due to differences in the prevalence of HIV within the general population of each country. In addition, changes in behavioral practices are key to understanding why HIV rates among these two groups declined between 2012 and 2015. The use of condoms is one such indicator. The survey results show that 89.7% of commercial sex clients who were sexually active in the 3 months before the survey had used a condom in the past week during intercourse with a FSW.

**Table 11:** Determinants of condom use by truck drivers during sexual intercourse with high risk-partners

Characteristics of respondents	Respondent used a condom during the last sexual encounter with a high-risk partner		P value
	No	Yes	
Prevention/treatment			
Knows the location of a screening center	60.2	62.6	0.60
Received free condoms in the last 6 months	56.8	87.2	0.0000*
Previously underwent HIV screening	41.3	56.2	0.002*
Knowledge of STDs and HIV/AIDS			
Knows at least three HIV prevention measures	27.9	32.5	0.30
Is aware of at least three modes of HIV transmission	84.7	92.8	0.01*
Understands that reducing the number of sexual partners lowers the risk of HIV/AIDS	28.2	28.8	0.90
Threat/risk perception			
Knows someone who has HIV/AIDS or who died from it	19.2	13.0	0.90
Is aware that correct condom use reduces the risk of HIV/AIDS	87.8	96.2	0.005*
Socio-demographic characteristics			
15-29 years old	36.9	36.6	0.93
Nationality=Benin	65.4	74.8	0.03*
Secondary education or higher	80.1	80.0	0.98
Religious affiliation=Muslim	32.2	31.1	0.79
Unmarried	46.9	41.5	0.24
Daily alcohol consumption	12.2	24.4	0.000*
Was a truck driver for 4 years or more at the time of survey	44.4	48.4	0.40
Listens to the radio every day or several times a week	28.4	18.7	0.02*

\*5% significance level



In the case of truck drivers, the corresponding percentage was 29.3%. Systematic use of the condom has always been a serious one, in truckers as reported other studies.<sup>[10,11]</sup>

HIV-related knowledge and exposure to public awareness messages also help explain the decline in HIV rates. In total, 79.5% of commercial sex clients and 59.4% of truck drivers were well-informed about the disease. In addition, most clients of FSWs (71.0%), as well as 37% of truckers, could access information on HIV prevention measures, most notably through demonstrations on correct condom usage. The fall in HIV rates between 2012 and 2015 highlights the effectiveness of the prevention programs that were implemented. None the less, the level of HIV prevalence remains high and groups at risk for infection continue to engage in high-risk behaviors. For instance, almost half of commercial sex clients had intercourse with occasional partners and FSWs. The rate was lower, although still significant, among truck drivers. It's known that Truckers expose themselves to the risk of HIV infection by having intercourse with occasional or commercial sex partners when they travel for work.<sup>[12]</sup> As such, truck drivers can potentially transmit STDs to the general population.<sup>[13]</sup>

In Togo, the results of a 2<sup>nd</sup>-generation surveillance survey conducted in 2011 showed that 66% of commercial sex clients were sexually active with multiple partners.<sup>[9]</sup> Regarding homosexuality, our study noted two cases of homosexual activity by truck drivers. Several studies carried out in West Africa and in other regions have shown that homosexual relationships significantly increase the risk of HIV transmission.<sup>[14-16,8]</sup> Our survey also noted cases of drug consumption in both groups under study. However, there was no correlation between drug use and HIV status, although previous studies have demonstrated a link between the use of injectable drugs and HIV infection.<sup>[17,18,9]</sup> Prevention efforts should focus on reinforcing awareness campaigns to discourage certain high-risk forms of sexual behavior among clients of FSWs and truck drivers.

## CONCLUSION

The results of our study are an improvement over those obtained from the 2012 survey. The significant drop in the rate of HIV prevalence among commercial sex clients and truck drivers could be the result of increased awareness about the virus and suggests that prevention programs are being effective. However, certain forms of high-risk behavior continue to be prevalent, underscoring the need to reinforce awareness campaigns through strategies that specifically address truck drivers and clients of FSWs. It is important to increase access to condoms (accessibility free of charge rather than paying distributors often vandalized), educate men on the need for condoms, train educators who would meet clients and FSWs in nightclubs, out of bars, hotels or on sites of the survey carried out to distribute the condom and raise awareness about its good use and importance.

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