International Journal of Science and Research Archive
eISSN: 2582-8185
Cross Ref DOI: 10.30574/ijsra
Journal homepage: https://ijsra.net/

(RESEARCH ARTICLE)

Check for updates

# Comparative study on sero-prevalence and risk factors of HIV/AIDs between intra-city and long-distance commercial drivers in Kano State

USMAN SUNUSI USMAN [1, 4, *], ALIYU MUHAMMAD MAIGORO [4], GANA MUHAMMAD LAWAN [1], JIBRIN ADAMU DAMAZAI [1], ABUBAKAR MUHAMMAD KURFI [3], IBRAHIM ADAM ABDULLAHI [2], KABIR MUSTAPHA YAKASAI [5] and ABDULWALI SABO [4]

[1] *Department of Community Medicine, Faculty of Clinical Sciences, College of Medical Sciences, Yobe State University, Damaturu, Nigeria.*
[2] *Department of Public Health, Faculty of Basic Medical Sciences, Bauchi State University, Gadau, Nigeria.*
[3] *Department of Planning, Research and Statistics, National Health Insurance Authority (NHIA) Headquaters, FCT Abuja. Nigeria.*
[4] *Department of Community Medicine, Faculty of Clinical Sciences, College of Medicine and Allied Health Sciences, Federal University Dutse, Jigawa State, Nigeria.*
[5] *National Primary Health Care Development Agency, Kano Zonal Office, Nigeria.*

International Journal of Science and Research Archive, 2023, 09(02), 077–089

Publication history: Received on 20 May 2023; revised on 01 July 2023; accepted on 04 July 2023

Article DOI: https://doi.org/10.30574/ijsra.2023.9.2.0514

## Abstract

**Background:** the transportation industry is primarily a male-dominated industry, of which drivers are at risk of contracting HIV. They spend a lot of time away from their wives or partners due to the nature of their occupation. Identifying risk factors of HIV among both the long distance and intra-city commercial drivers could provide strategies for effective prevention and control.

**Aim**: this study assessed the Sero-prevalence and risk factors of HIV infection among commercial drivers in Kano Central Senatorial District.

**Method:** Cross-sectional comparative study design was used. A multi-stage sampling technique was used to select 434 study participants from each category.

**Results:** a total of 407 LDDs and 418 Intra-city drivers participated in the study. The mean and standard deviation of age of the respondents in the LDDs and Intra-city drivers groups were 42.3± 11.2 and 42.0 ± 11.3 years respectively. The sero-prevalence of HIV between LDDs and Intra-city drivers was found to be 12.5% and 6.7% respectively. The LDDs were two times at risk of being HIV Sero-positive (OR=2.00 95% CI of OR 1.20 – 3.33, p<0.05) than the Intra-city drivers. On adjusting for the confounding effects for LDDs group using logistic regression analysis, the risk factors for HIV were marital status of single [AOR=4.25; (95% CI: 1.97- 9.31)] and separated [ AOR=6.07; (95% CI: 5.26-16.45)], monthly income [>100,000.00 AOR=6.11; (95% CI: 1.53-41.97)] and history of extra-marital sex [AOR=4.01; (95% CI: 6.07-10.43)]. While on adjusting for the confounding effects for Intra-city drivers group using logistic regression analysis, educational status [post-secondary AOR=0.33; (95% CI: 0.16-0.89)], marital status [separated AOR=3.00; (95% CI: 5.26-16.33)], working experience [ 11-20 years AOR=4.10; (95% CI: 1.19-18.25)], history of extra-marital sex [AOR=4.97; (95% CI: 6.07-10.43)] and use of drugs or alcohol [AOR=3.98; (95% CI: 2.04-12.43)].

**Conclusion:** the establishment of STI clinics in strategic locations, as well as making condoms available, accessible, affordable, and acceptable for use by this group of people in our society, should all be part of the prevention strategy.

* Corresponding author: USMAN SUNUSI USMAN

Government and all key stakeholders must take appropriate measures to educate this occupational group in order to change and improve their sexual behaviors.

**Keywords:** Human immune-deficiency virus; Long distance drivers; Intra-city drivers; Risk; Sero-prevalence

## 1. Introduction

There is a strong link between movement and HIV virus dissemination [1]. People are more likely to have sex partners other than their spouses or regular partners when they are away from home. Thus, the transportation sector plays a critical role in facilitating people's movement and thereby spreading HIV/AIDs pandemic [1-2]. The transportation industry is primarily a male-dominated industry, and drivers are at risk of contracting HIV. They often visit commercial sex workers to satisfy their sexual cravings sometimes without utilizing any preventive measures like condoms [3]. This raises the risk of HIV infection in road transport employees, who then pass the virus on to their partners [1-3]. Therefore, AIDS develops when HIV is left untreated. It is well documented that truck drivers play an important role in the global spread of the HIV epidemic. Sexual behavior of long-distance drivers is associated with sexually transmitted diseases (STIs) and HIV transmission in Nigeria and other parts of Africa as well as the rest of the world [4-5]. Long-distance drivers are considered to be particularly vulnerable to sexually transmitted diseases and HIV infections because they spend days away from their families; In contrast to short-distance drivers, where they always return home on daily basis after closing from work [2-3,5-6].

Nigeria is the most populous nation of black people in the world with an estimated population of over 200 million in 2020[7]. Nigeria has the second largest HIV epidemic in the world and one of the highest rates of new infection in sub-Saharan Africa [8-9]. Previously, the national ANC-HIV positive rate increased from 1.8% (1991) to 5.8% (2001) and decreased to 4.1% (2010). As of 2001, the central and southern states of Nigeria have a higher prevalence than other states, with the Benue, Rivers and Cross Rivers notable. Benue was the highest in 2001 (14%), 2005 (10%) and 2010 (12.7%). Overall, eight states (21.6%) showed an increase in HIV prevalence rates, while six states (16.2%) showed an absolute decrease of at least 2% between 2001 and 2010. An estimated 3.19 million people live with HIV / AIDS in Nigeria in 2010 and the overall population prevalence is projected to drop from 3.34% in 2011 to 3.27% in 2012. The latest national HIV prevalence rate in Nigeria was 1.4% for adults aged 15-49 years. Previous estimates had a national HIV prevalence rate of 2.8% [8]. The UNAIDS and the National Agency for the Control of AIDS estimate that 1.9 million people live with HIV in Nigeria [8-9]. Thus, the prevalence rate had dropped by more than 40% of 2012 estimates. The south-south zone of the country has the highest HIV-positive rate among adults aged 15-49 years, at 3.1%. The HIV prevalence rate is also high in the north central zone (2.0%) and the southeast zone (1.9%) [8]. The HIV positive rate is low in the southwest zone (1.1%), northeast zone (1.1%), and northwest zone (0.6%) [8]. A better understanding of the HIV epidemic in the country will enable more efficient investment in HIV control and planning to provide HIV prevention, care and treatment services, including a focus on key groups such as female sex workers, truck drivers, prison inmates and other most at risk populations (MARPs) [2,8-9].

Globally, in 2020, an estimated 37.7 million people (30.2 million–45.1 million) were living with HIV worldwide; out f which more than 90% were adults (36.0 million). Among all the HIV positive people, about 53% of them were women and girls [9]. But, about 84% of all people living with HIV knew their status. New HIV infections have been reduced by 52% since the peak in 1997; in 2020, around 1.5 million (1.0–2.0 million) people were newly infected with HIV, compared to 3.0 million (2.1–4.2 million) people in 1997 [9]. Since 2010, new HIV infections have declined by 31%, from 2.1 million (1.5– 2.9 million) to 1.5 million (1.0 –2.0 million) in 2020 [9]. However, AIDS-related deaths have been reduced by 64% since the peak in 2004 and by 47% since 2010. AIDS-related mortality has declined by 53% among women and girls and by 41% among men and boys since 2010 [8-9].

In many African countries, a level of generalized epidemic has occurred i.e. national HIV prevalence rate of above 1%) [11]. However, in these countries with generalized epidemics, multiple sexual partners, low condom use, and low age at first-sex were identified as significant contributors to high HIV morbidity [2,4,6,11]. HIV prevalence in urban areas of Zimbabwe dropped from a very high peak of almost 6% in 1991 to less than 1% in 2010 [12]. The vast majority of newly infected people in sub-Saharan Africa are infected through unprotected heterosexual sexual intercourse (including paid sex) [11]. Unprotected sex with multiple partners continues to be the number one risk factor for HIV in the region [4-6,11-13]. Most people who live with HIV have long-term relationships. It is 62% in Kenya and 78% in Malawi [11].

In addition, there are actually only two ways to tackle this epidemic: preventing new HIV infections and getting antiretroviral treatment for those who need them [9,11]. Female commercial sex workers (CSWs), truck drivers, and

men having sex with men (MSMs) were the country's highest-risk population (MARP) and, in some states, regional HIV/AIDS infection rate is up to 30% [11].

Transport workers, in general, share some common characteristics that are likely to put them at high risk of HIV infection [2,4,11]. These include low level of general education and health knowledge, high use of alcohol, low or erratic use of condoms and other preventive measures and reasonably high level of disposable income [1-4,12-13}. Therefore, this study aimed to assess the sero-prevalence and risk factors of HIV/AIDs among commercial drivers in Kano State

## 2. Material and methods

### 2.1. Study Area

The study was conducted in the Kano Central Senatorial Local Government Areas (LGAs) of Kano State. Kano State is a state located in North-Western Nigeria. Created on May 27, 1967 from part of the Northern Region, Kano state borders Katsina State to the north-west, Jigawa State to the north-east, Bauchi State to the south-east and Kaduna State to the south-west. The capital of Kano State is Kano. The state has an estimated population of over fourteen million people as at 2014. The Kano Central Senatorial Districts comprises of fifteen LGAs (Dala, Gwale, Tarauni, Kano Municipal, Fagge, Nassarawa, Ungogo, Kumbotso, Gezawa, Madobi, Kura, Garun Mallam, Warawa, Gezawa, Dawakin Kudu). They have an estimated population of over eight million people.

The LDDs used to travelled from Kano to different part of Nigeria like Lagos, Sagamu, Port Harcourt, Onitsha, Aba, Makurdi, Warri, Jos, Maiduguri, Bama, Baga, Kontagora, Birnin Kebbi etc. while, the Intra-city drivers utilizes different minor and major routes in the Kano Central Senatorial District. There are no established brothels around the motor parks due to activities of Hisbah Board established by Kano State Government. Commercial drivers also utilize health facilities and services available in the district like the way general population do. None of the motor parks have any established health facility inside the park. There are about seventy four joints for Intra-city drivers distributed in the Kano Central senatorial District and Eighteen motor parks for LDDs. The motor parks for LDDs are: Rijiyar Zaki, Naibawa, Unguwa Uku, Kano Line, Dawanau, Rijiyar Lemo, Kofar Ruwa, Shahuci, Dakata, Yankaba, Kwanar Dawaki, Janbulo, Sabon Titi, New Road Sabon Gari, Ladin Makole, Yan Rake Kofar Kansakali, and Mallam Kato Square.

### 2.2. Study Design

This was a comparative cross-sectional descriptive study.

### 2.3. Study Population

This comprised of all the eligible commercial drivers' within the study area, who were selected and agreed to participate

*2.3.1. Inclusion Criteria*

- Involve in commercial driving for at least one year
- Participants who are aged 20 to 69 years

*2.3.2. Exclusion Criteria*

- Failure to give consent for the study
- Commercial drivers who have change either from long distance to intra-city or vice versa.

### 2.4. Sample Size Determination

The minimum sample size for the study was estimated using an appropriate formula for calculating sample size for comparative studies [15] i.e

$$n = (Z_\alpha + Z_\beta)^2 (p_1q_1 + p_2q_2) / (p_2 - p_1)^2$$

Where n = minimum sample size required
$Z_\alpha$ = Reliability coefficient at 95% confidence level i.e the standard normal deviate corresponding to 5% level of significance =1.96;
$Z_\beta$ = represents the standard normal deviate corresponding to the power of the test (95%) to detect differences. =1.64
$p_1$= 10% or 0.1 is the Sero-prevalence of HIV among LLDs from previous studies; [16]
$Q_1$= the complementary probability to $p_1$ i.e 1-0.1, which equaled 0.9;

$P_2$ = represents Sero-prevalence of HIV among intra-city commercial drivers in Nigeria which was assumed to be 3.6% or 0.036 [17]; and
$q_2$ =is the complementary probability to $p_2$ i.e 1-0.036, which equaled to 0.964.

By substituting the values obtained into the formula,

$$n = (1.96 + 1.64)^2 [(0.9 \times 0.1) + (0.036 \times 0.964)] / (0.1-0.036)^2$$

$$n = 394.55$$

To cover for non-responses and to increase precision, 434 (including 10% of the minimum sample size) subjects were recruited each for the LDDs and intra-city commercial drivers groups.

### 2.5. Sampling Techniques

A multistage sampling technique was used as follows:

- Stage I: Simple random sampling was used to select four (Gezawa, Ungogo, Tarauni and Dala) LGAs from the list of fifteen LGAs in Kano Central Senatorial District.
- Stage II: A list of all the LDDs motor parks and intra-city motor parks/joint who had met the inclusion criteria was obtained. There were eighteen LDDs motor park and seventy four intra-city motor park/joint. Five LDDs motor park and twenty intra-city motor park/joints were selected using simple random sampling by balloting.
- Stage III: Selection of the eligible study participants was done by simple random sampling using balloting from the selected motor parks for LDDs and motor parks/joints of intra-city commercial drivers.

### 2.6. Variables

#### *2.6.1. Dependent Variable*

These include Sero-prevalence as well as the risk factors of HIV

#### *2.6.2. Independent Variables*

Socio-demographics characteristics such as age, marital status, monthly income, educational status, religion

### 2.7. Data Collection

A semi-structured interviewer administered questionnaire, consisting of 3 sections (A to C) was used for data collection in the study. Section A of the questionnaire sought information on respondents' bio-data, and Section B sought information on risk factors of HIV/AIDs among commercial drivers and Section C was used to record the HIV status results for the participants

Blood collection and screening: All subjects underwent pre-testing HIV counseling and then subsequent testing. Three to five milliliters of blood was drawn from the antecubital fossa and tested for HIV antibodies. For each eligible individual recruited for this study, demographic information was recorded in a structured questionnaire. Identification number was given unique to study participants. Sterile Vacutainer tubes (BD, Franklin Lakes, NJ, USA) were used to collect the blood. Each plasma sample obtained was screened for HIV immediately.

Each sample was initially screened with a Rapid HIV testing kit (Determine, Inverness Medicom, Japan). All samples with a non-reactive result were reported as negative, whereas reactive samples in the initial testing were further tested using Stat pak (Chembio Diagnostic Systems, Inc, Medford, NY, USA). All negative subjects were counseled appropriately. All positives participants were counseled and referred to facility where they can access appropriate care.

Data was summarized and presented using tables and summary indices. The relationships between risk factors and HIV were evaluated using bivariate and multivariate analyses. A p-value of $<0.05$ is considered as significant. A logistic regression analysis performed to determine significant risk factors for HIV disease among Study participants and odds ratios were used as measure of effect with corresponding 95% confidence interval.

### 2.8. Ethical Considerations

- Ethical approval was obtained from Kano state Ministry of Health Ethical committee that the study will be beneficial and will not cause any harmful effect;
- An informed consent from respondents was obtained and assurance given;
- For justice, the participants were given the right to voluntarily accept or reject to participate and also to skip any distressing questions if they wish; and
- For confidentiality of data storage, a password was used in the computer. Confidentiality maintained throughout the study and non-personal identifiers were used during data entry and analysis.

### 2.9. Limitations

- In this study, participation was entirely voluntarily; therefore, those who have suspected risk factors of HIV/AIDs were less likely to participate making the findings (outcomes) prone to selection bias.
- Some of the study participants had low level of education that made the researcher/research assistants to translate the questionnaire into local language (interviewer bias).

## 3. Results

### 3.1. Socio-demographic characteristics of study participants

The mean age and standard deviation of respondents in the LDDs and Intra-city drivers group was 42.3± 11.2 and 42.0 ± 11.3 years respectively. There was no statistically significant difference in the age group (P-value >0.05). There was no statistically significant difference in most of the socio-demographic variables (P >0.05) except the ethnic group (P-value <0.05), as majority of the participants in both groups were Hausas. Hence, the socio-demographic variables among the study participants were essentially comparable as shown in Table 1.

**Table 1** Distribution of study participants according to Socio-demographic status

| | **Long Distance Drivers** | | **Intra-City Drivers** | | | |
|---|---|---|---|---|---|---|
| **Variables** | **Frequency** | **Percentage** | **Frequency** | **Percentage** | **$X^2$** | **P-value** |
| Age (years) | | | | | | |
| 20 – 29 | 53 | 13.0 | 62 | 14.8 | 0.2102 | 0.8330 |
| 30 – 39 | 124 | 30.5 | 137 | 32.8 | | |
| 40 – 49 | 116 | 28.5 | 109 | 26.1 | | |
| 50 – 59 | 87 | 21.4 | 62 | 14.8 | | |
| 60 – 69 | 27 | 6.6 | 48 | 11.5 | | |
| Mean ± SD | 42.3 ± 11.2 | | 42.0 ± 11.3 | | | |
| Ethnic Group | | | | | | |
| Hausa | 348 | 85.5 | 383 | 91.6 | 31.31 | 0.0001 |
| Others | 99 | 14.5 | 35 | 8.4 | | |
| Educational Status | | | | | | |
| Non-formal | 145 | 35.6 | 76 | 18.2 | 3.48 | 0.734 |
| Primary | 122 | 30.0 | 143 | 34.2 | | |
| Secondary | 100 | 24.6 | 154 | 36.8 | | |
| Post-secondary | 40 | 9.8 | 45 | 10.8 | | |
| Marital Status | | | | | 8.68 | 0.119 |
| Single | 127 | 31.2 | 164 | 39.2 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Married | 243 | 59.7 | 210 | 50.2 | | |
| Separated | 21 | 5.2 | 30 | 7.2 | | |
| Divorced | 16 | 3.9 | 14 | 3.3 | | |
| No of wives | | | | | 3.10 | 0.08 |
| 1 | 91 | 35.3 | 67 | 26.8 | | |
| >1 | 167 | 64.7 | 173 | 73.2 | | |
| Monthly Income | | | | | | |
| <N30,000.00 | 51 | 12.5 | 146 | 34.9 | 5.89 | 0.07 |
| N30,001.00 – 50,000.00 | 90 | 22.1 | 193 | 46.2 | | |
| N50,001.00 – 100,000.00 | 162 | 39.8 | 51 | 12.2 | | |
| >100,000.00 | 104 | 25.6 | 18 | 4.3 | | |
| Working Experience | | | | | | |
| <5 years | 126 | 31.0 | 163 | 40.0 | 6.78 | 0.06 |
| 5 – 10 years | 148 | 36.4 | 162 | 38.8 | | |
| 11 – 20 years | 93 | 22.9 | 61 | 14.6 | | |
| >20 years | 40 | 9.8 | 32 | 7.6 | | |

### 3.2. Sero-prevalence of HIV/AIDs

The Sero-prevalence of HIV/AIDs among both LDDs and intra-city commercial drivers was 12.5% and 6.7% respectively (Table 2). The prevalence of HIV/AIDs among the LDDs was almost twice that of intra-city commercial drivers; but, the cumulative prevalence i.e for both the LDDs and intra-city commercial drivers add up together was 9.6%. Long distance drivers were two times more likely to be HIV sero-positive than intra-city drivers. (OR=2.00 95% CI of OR 1.20 – 3.33). However, this relationship was found to be statistically significant (p=0.0044) as shown in Table 3.

**Table 2** HIV Sero-positivity among the study participants

| **Variables** | **LDDs** | | **Intra-city** | | **Cumulative** | |
|---|---|---|---|---|---|---|
| **Screening Test Result** | **Frequency (n)** | **Percentage (%)** | **Frequency (n)** | **Percentage (%)** | **Frequency (n)** | **Percentage (%)** |
| Positive | 51 | 12.5 | 28 | 6.7 | 79 | 9.6 |
| Negative | 356 | 87.5 | 390 | 93.3 | 746 | 90.4 |
| Total | 407 | 100 | 418 | 100 | 825 | 100 |

**Table 3** Comparison of HIV Sero-positivity between LDDs and Intra-city drivers

| **Variables** | **LDDS** | **Intra-city drivers** | **OR** | **95% CI of OR** | **P-value** |
|---|---|---|---|---|---|
| Screening Test Result | | | 2.00 | 1.20 – 3.33 | 0.0044* |
| Positive | 51 | 28 | | | |
| Negative | 356 | 390 | | | |
| Total | 407 | 418 | | | |

*Statistically significant difference

### 3.3. Risk factors of HIV/AIDs among the study participants

The risk factors for HIV/AIDs among LDDs and intra-city commercial drivers identified in this study included history of extra-marital sex, history of urethral discharge, number of sexual partners in the last twelve month prior to this study, sexual intercourse under the influence of drugs. There was a statistically significant association between LDDs and intra-city commercial drivers in terms of the following risk factors: No of sexual partners in the last twelve month (P<0.001), regular use of condom during extra-marital sex (P=0.010), sex under the influence of drugs or alcohol (P=0.0089), history of extra-marital sex in the last twelve month prior to this study (P<0.001), history of genital ulcer or urethral discharge (P=0.0006), and previous participation in HIV/AIDS preventive measures campaign (P=0.035) as indicated in Table 4.

**Table 4** Risk factors of HIV/AIDs among study participants

| **Risk factors** | **Long Distance Drivers** | | **Intra-City Drivers** | | **$X^2$** | **P-value** |
|---|---|---|---|---|---|---|
| | **Frequency** | **Percentage (%)** | **Frequency** | **Percentage (%)** | | |
| **No of sexual partners in the last twelve month** | | | | | **15.96** | **<0.001** |
| **1** | 58 | 14.3 | 106 | 25.4 | | |
| >1 | 349 | 85.7 | 312 | 74.6 | | |
| **Regular use of condom during extra-marital sex** | 202 | 49.6 | 243 | 58.1 | 5.99 | **0.010** |
| **Previous participation in HCT/VCT** | 168 | 41.3 | 195 | 46.7 | 2.42 | 0.1203 |
| **Age at first sexual intercourse** | | | | | 0.21 | 0.6433 |
| ≤25 years | 106 | 26.0 | 103 | 24.6 | | |
| >25 years | 301 | 74.0 | 315 | 75.4 | | |
| **Sex under the influence of drugs or alcohol** | 137 | 33.7 | 106 | 25.4 | 6.83 | **0.0089** |
| **History of extra-marital sex in the last twelve month** | 238 | 58.5 | 103 | 24.6 | 92.35 | **<0.001** |
| **History of blood transfusion in the past** | 22 | 5.4 | 16 | 3.8 | 1.17 | 0.2801 |
| **History of genital ulcers or urethral discharge** | 76 | 18.7 | 43 | 10.3 | 11.73 | **0.0006** |
| **Previous participation in HIV/AIDs preventive measures campaign** | 109 | 26.8 | 140 | 33.5 | 4.40 | **0.035** |

After adjusting for the confounding effects using logistic regression analysis for intra-city commercial drivers; educational status of post-secondary (AOR=0.33,95%CI=0.16-0.89), marital status of separated (AOR=3.00, 95%CI=1.26-16.33), working experience of 11 – 20 years (AOR=4.10, 95%CI= 1.19-18.25), regular utilization of condom during sexual intercourse in the last twelve month prior to this study (AOR=0.24, 95%CI=0.09-0.61), previous participation in VCT/HCT (AOR=0.23, 95%CI=0.09-0.58), sexual intercourse under the influence of drugs or alcohol (AOR=3.98, 95% CI= 2.04 – 12.43), and history of extra-marital sex (AOR=4.01, 95%CI=6.07 – 10.43) remained significant predictors of HIV/AIDs Sero-prevalence (Table 5).

**Table 5** Multivariate (Logistic Regression) Analysis of predictors of Sero-prevalence of HIV/AIDS among Intra-City Commercial Drivers

| **Predictor(s)** | **Crude OR (95% CI)** | **Adjusted OR (95% CI)** | **p-value** |
|---|---|---|---|
| Educational status | | | |
| Non-formal | Referent | | |
| Primary | 1.75 (0.84 – 3.64) | 1.61 (0.90 – 2.87) | 0.1040 |
| Secondary | 0.48 (0.16 – 1.36) | 0.51 (0.21 – 1.25) | 0.1311 |
| Post-Secondary | 0.67 (0.10 - 2.02) | 0.33 (0.16 – 0.89) | 0.0001* |
| Marital status | | | |
| Married | Referent | | |
| Single | 0.44 (0.15 – 1.13) | 0.73 (0.43 – 3.37) | 0.0817 |
| Divorced | 2.76 (0.88 – 12.23) | 5.76 (0.99 – 10.03) | 0.4821 |
| Separated | 5.53 (3.57 – 13.47) | 3.0 (1.26 – 16.33) | 0.0031* |
| Monthly income | | | |
| <N30,000.00 | Referent | | |
| N30,001.00 – 50,000.00 | 0.65 (0.22 – 7.38) | 0.45 (0.13 – 10.41) | 0.1752 |
| N50,001.00 – 100,000.00 | 1.16 (0.67 – 13.11) | 1.93 (0.83 – 17.22) | 0.2113 |
| >100,000.00 | 3.35 (1.46 – 22.79) | 4.75 (0.61 – 27.99) | 0.6981 |
| Working - experience | | | |
| <5 years | Referent | | |
| 5 – 10 years | 1.01 (0.25 – 4.10) | 0.88 (0.30 – 3.41) | 0.9921 |
| 11 – 20 years | 6.20 (1.83 – 21.99) | 4.1 (1.19 – 18.25) | <0.005 |
| >20 years | 3.99(0.74 – 32.18) | 2.5 (0.63 – 24.79) | 0.3427 |
| Use of condom in the last twelve month | | | 0.00003* |
| No | Referent | | |
| Yes | 0.17 (0.06 – 0.45) | 0.24 (0.09 – 0.61) | |
| Previous participation in HCT/VCT | | | 0.0258* |
| No | Referent | | |
| Yes | 0.14 (0.04 – 0.43) | 0.23 (0.09 – 0.58) | |
| Sex under the influence of drugs or alcohol | | | <0.001* |
| No | Referent | | |
| Yes | 6.18(2.59 – 14.78) | 3.98 (2.04 – 12.43) | |
| History of extra-marital sex | | | <0.001* |
| No | Referent | | |
| Yes | 9.25 (3.7 – 23.80) | 4.97 (2.53 – 11.82) | |
| History of genital ulcers or urethral discharge | | | 0.7649 |
| No | Referent | | |
| Yes | 8.23 (5.08 – 13.41) | 2.03 (1.16 – 8.92) | |

*Statistically significant difference

In terms of LDDs, after adjusting for the confounding effects using logistic regression analysis; educational status of secondary (AOR=0.4,95%CI=0.19-0.84) and post-secondary (AOR=0.25,95%CI=0.13-0.97), marital status of single (AOR=4.25, 95%CI=1.79-9.31) and separated (AOR=6.07, 95%CI=5.26-16.45), monthly income of >N100,000.00 (AOR=6.11, 95%CI= 1.53-41.97), regular utilization of condom during sexual intercourse in the last twelve month prior to this study (AOR=0.33, 95%CI=0.11-0.72), previous participation in VCT/HCT (AOR=0.25, 95%CI=0.16-0.95), history of extra-marital sex (AOR=4.01, 95%CI=6.07 – 10.43) and previous participation in HIV/AIDs preventive measures campaign (AOR=0.40, 95%CI=0.25-0.97) remained significant predictors of HIV/AIDs Sero-prevalence (Table 6).

**Table 6** Multivariate (Logistic Regression) Analysis of predictors of Sero-prevalence of HIV/AIDS among Long Distance Commercial Drivers

| **Predictor** | **Crude OR (95% CI)** | **Adjusted OR (95% CI)** | **p-value** |
|---|---|---|---|
| Educational status | | | |
| Non-formal | Referent | | |
| Primary | 0.50 (0.18 – 1.37) | 0.62 (0.21 – 2.23) | 0.1817 |
| Secondary | 0.22 (0.06 – 0.74) | 0.40 (0.19 – 0.84) | 0.0361* |
| Post-Secondary | 0.47 (0.10 - 2.02) | 0.25 (0.13 – 0.97) | 0.0279* |
| Marital status | | | |
| Married | Referent | | |
| Single | 2.29 (0.81 – 6.61) | 4.25 (1.79 – 9.31) | 0.0212* |
| Divorced | 4.46 (1.01 – 18.65) | 5.76 (1.23 – 11.19) | 0.7531 |
| Separated | 4.11 (2.57 – 23.65) | 6.07 (5.26 – 16.45) | 0.0461* |
| Monthly income | | | |
| <N30,000.00 | Referent | | |
| N30,001.00 – 50,000.00 | 0.97 (0.32 – 2.98) | 0.85 (0.47 – 5.68) | 0.3542 |
| N50,001.00 – 100,000.00 | 3.16 (0.93 – 10.73) | 2.86 (0.99 – 12.56) | 0.6754 |
| >100,000.00 | 7.64 (1.79 – 32.48) | 6.11 (1.53 – 41.97) | 0.0199* |
| Use of condom in the last twelve month | | | 0.0012* |
| No | Referent | | |
| Yes | 0.21 (0.09 – 0.45) | 0.33 (0.11 – 0.72) | |
| Previous participation in HCT/VCT | | | 0.0258* |
| No | Referent | | |
| Yes | 0.50 (0.25 – 0.88) | 0.25 (0.16 – 0.95) | |
| Age at first sexual intercourse | | | 0.3410 |
| ≤25 years | Referent | | |
| >25 years | 2.03 (1.05 – 3.89) | 2.8 (0.97 – 5.23) | |
| Sex under the influence of drugs or alcohol | | | 0.5436 |
| No | Referent | | |
| Yes | 4.03(2.10 – 7.77) | 3.52 (0.86 – 12.65) | |
| History of extra-marital sex | | | 0.0017* |
| No | Referent | | |
| Yes | 2.90 (1.38 – 6.22) | 4.01 (6.07 – 10.43) | |

| | | | |
|---|---|---|---|
| History of genital ulcers or urethral discharge | | | 0.7649 |
| No | Referent | | |
| Yes | 3.69 (1.87 – 7.24) | 1.97 (0.64 – 6.23) | |
| Previous participation in HIV/AIDs preventive measures campaign | | | 0.0007* |
| No | Referent | | |
| Yes | 0.40 (0.16 – 0.95) | 0.33 (0.25 – 0.97) | |

*Statistically significant difference

## 4. Discussions

The Sero-prevalence of HIV among both the LDDs and Intra-city drivers was 12.5% and 6.7% respectively. The cumulative results of HIV sero-prevalence among both LDDs and intra-city commercial drivers was 9.7%. The highest Sero-prevalence rate was among the age group of 30–39 years. The finding among LDDs was less than the finding by Dibua U in south eastern Nigeria, who reported a sero prevalence of 19% among long distance drivers [18]. For LDDs, it was about five times greater than findings by Atilola, who reported the Sero-prevalence of HIV of 2.4% among long distance drivers in South-Western Nigeria [19]. But, was almost similar to findings by Azunwo in Port Harcourt who reported 10% [16]. Studies from other part of Africa and Asia have also reported different Sero-prevalence of HIV among transport workers ranging from low level by Andrew who reported a Sero-prevalence of 0.94% in Port City of Ghana, Sing in India who reported 2.16%, and Pandey in India who Reported 4.6% to high level by Delany-Moretiwe who reported sero-prevalence of HIV of 26% among truck drivers in South Africa [20-23]. The sero-prevalence of HIV among LDDs reported in this study was about nine times the national average while that among Intra-city drivers was about five times the national average [8-10]. When the sero-prevalence of HIV was compared between LDDs and Intra-city drivers, it was found out that, the long distance drivers were two times at risk of being HIV Sero-positive (OR=2.00 95% CI of OR 1.20 – 3.33) than the Intra-city drivers. However, this relationship was found to be statistically significant at 5% level. This means that the risk of HIV/AIDS increases two fold among LDDS when compared to intra-city drivers. This has shown that, for those who are changing driving status from intra-city drivers to LDDs, they are invariably at increased risk of being infected.

The risk for HIV transmission increases with a higher number of sexual partners, especially when these partners are from high risk group [2,24-25]. Those who have more than one sexual partner within the last twelve month preceding our studies were four times more likely to be HIV positive compared to those who have one sexual partner among LDDs. When compared between LDDs and Intra-city drivers, the LDDs risk of being HIV sero-positive was three times than Intra-city drivers. However, this finding was not statistically significant ($p>0.05$). Extra-marital sex was found to be an important risk factor for HIV sero-positivity, as both LDDs and Intra-city drivers who engaged themselves in extra-marital sex were four times and five times at risk of being infected with HIV respectively, as reported in other studies [2,4,27].

About half of the study participants use condom in the last twelve month. This was similar to findings by Sunmola among truck drivers in Nigerian highways, where low and erratic patronage of condom because of decrease sexual pleasure was reported [4]. But, findings by Idris on use of condom among transport workers were lower than of this study [27]. Irregular and erratic use of condoms coupled with multiple sexual partners predisposes this drivers to sexually transmitted infections particularly HIV/AIDs as reported in many studies [2,4,16,19]. The practice of safer sex with the use of condoms can prevent HIV transmission especially among those with multiple sexual partners [29].

Studies have reported that participation in HCT/VCT was found to decrease the risk of HIV infection among participants more especially those at high risk group. In this study, only two-fifth of the LDDs and about half of Intra-city drivers have ever participated in HCT/VCT. Findings of this study with regards to uptake of HCT were slightly higher than findings of Hassan in Jos and IBBSS of 2010 [30-32]. This low uptake of HCT among the study participants have a serious implication on transmission of HIV [31,33].

The risk of HIV infections in both groups increases from age 20 – 39 years and after that start decreasing in both the group of long distance and short distance commercial motor vehicles. In this study almost one quarter of the participants experienced sexual intercourse before the age of twenty five years. Early exposure to sexual intercourse increases the risk of transmission of sexually transmitted infections particularly HIV infection as reported in many studies [34-37]. It was recorded that in this study more than one quarter in both the LDDs and Intra-city drivers group

had sexual intercourse under the influence of drugs or alcohol previously. Sex under the influence of drugs or alcohol may make someone further not to adequately protect himself/herself. This can make someone more vulnerable and promote infections with sexually transmitted diseases [4,26,38-39]

## 5. Conclusion

The Sero-prevalence of HIV/AIDs was 12.5 and 6.7% among the LDDs and intra-city commercial drivers: but, cumulatively, the Sero-prevalence of HIV/AIDs among the study participants was 9.7%. This is nearly seven times the Nigerian national average thereby making the LDDS and intra-city commercial drivers as highly risky group of people in Nigeria. The risk factors identified in the study include marital status of single and separated, high monthly income, history of extra-marital sex. While the protective factors identified in the study included educational status of secondary and post-secondary, use of condom in the last twelve month preceding the study and previous participation of HIV/AIDs preventive measures campaign. Understanding the risk factors will help in addressing the problem of high prevalence of HIV/AIDs among the study participants. There is an immediate need to implement suitable HIV/AIDS prevention measures among this unique group of people in society who serve as a major risk factor for the transmission of HIV.

### *Recommendations*

It was recommended that, the establishment of STI clinics in strategic locations, as well as making condoms available, accessible, affordable, and acceptable for use by this group of people in our society, should all be part of the prevention strategy. Government and all key stakeholders must take appropriate measures to educate this occupational group in order to change and improve their sexual behaviors.

## Compliance with ethical standards

### *Acknowledgments*

The authors acknowledge all the study participants and relevant government agencies for their support and cooperation during the conduct of the study.

### *Disclosure of conflict of interest*

There is no conflict of interest.

### *Statement of ethical approval*

Ethical approval was obtained from Kano state Ministry of Health Ethical committee that the study will be beneficial and will not cause any harmful effect

### *Statement of informed consent*

An informed consent from respondents was obtained. Also, assurance of safety and no harm was given to all the study participants.

### *Author's contribution*

- Dr Usman Sunusi Usman- contributed in the design, data analysis and drafting the article for intellectual content
- Dr Abubakar Muhammad Kurfi- conducted analysis, developed and finalized the manuscript and provided necessary reference document
- Dr Jibrin Adamu Damazai- participated in data analysis and drafting the articles for intellectual content
- Dr Gana Muhammad Lawan- developed and finalized the manuscript and provided necessary reference documents
- Dr Adam Ibrahim Abdullahi- contributed in the discussion and provided relevant documents for references.
- Dr Aliyu Muhammad Maigoro- contributed in data collection, discussion and interpretation of study findings.
- Mr. Abdulwali Sabo- contributed in the discussion and provided other relevant documents for references.
- Dr Kabir Mustapha Yakasai- contributed in data analysis and discussion

## References


[1] Whiteside A. How the transport sector drives HIV / AIDS and how HIV/ AIDS drives transport. Economic impact: Southern Africa. AIDS Anal Afr. 1998; 8(2):5-6, 15. PMID: 12293623

[2] Ekanem EE, Afolabi BM, Nuga AO, Adebajo SB. Sexual behaviour, HIV-related knowledge and condom use by intra-city commercial bus drivers and motor park attendants in Lagos, Nigeria. Afr J Reprod Health. 2005; 9(1):78-87. PMID: 16104657.

[3] Arulogun OS, Oladepo O and Titiloye MA. Perceptions of self vulnerability to HIV infection among Long Distance Truck Drivers in Ibadan, Nigeria. Journal of Basic and Applied Scientific Research. 2011; 1 (10): 1380-1385

[4] Sunmola AM. Sexual practices, barriers to condom use and its consistent use among long distance truck drivers in Nigeria. AIDS Care 2005; 17: 208-21.

[5] Alam N, Rahman M, Gausia K, Yunus MD, Islam N, 3. Chaudhury P, et al. Sexually transmitted infections and risk factors among truck stand workers in Dhaka, Bangladesh. Sex Transm Dis 2007; 34: 99-103.

[6] Malta M, Bastos FI, Pereira-Koller EM, Cunha MD, Marques C, Strathdee SA: A qualitative assessment of long distance truck drivers' vulnerability to HIV/AIDS in Itajai, southern Brazil. AIDS Care; 2006, 18:489-496.

[7] World bank: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=NG

[8] National AIDS Indicator Survey (NAIS) preliminary report: Federal Ministry of Health of Nigeria. 2019. Page 1-3.

[9] Michel S. Report on the global AIDS epidemic The Gaps. UNAIDS. 2014. Page 26 – 30.

[10] Winnie B. 2020 Global AIDS Update — Seizing the moment — Tackling entrenched inequalities to end epidemics.

[11] Michel S. Report on the global AIDS epidemic. UNAIDS. 2013. Page 14 – 16.

[12] Magret C, Anthony L, Michel S. Report on the global HIV/AIDS response: Epidemic update and health sector progress towards Universal Access. UNAIDS, WHO, UNICEF. 2011.

[13] Lurie MN. Migration, sexuality and the spread of HIV/AIDs in rural South Africa. Cape Town, South Africa.: South African Migration Project. 2004. Page 3 – 6.

[14] Adebobola Bashorun, Patrick Nguku, Issa Kawu, Evelyn Ngige, Adeniyi Ogundiran, Kabir Sabitu, Abdulsalam Nasidi, Peter Nsubuga. A description of HIV prevalence trends in Nigeria from 2001 to 2010: what is the progress, where is the problem?. Pan Afr Med J. 2014;18(Supp 1):

[15] Jekel JF, Joann GE, David LK, Dorothea MGW. Epidemiology, Biostatistics and Preventive Medicine, 3rd edition: Saunders, Elservier; 2007. Page 56

[16] Azuonwu O, Erhabor O, Frank-Peterside N: HIV infection in long-distance truck drivers in a low income setting in the Niger Delta of Nigeria. J Community Health. 2011; 36(4):583-7.

[17] Federal Ministry of Health: HIV/Syphilis Sero-Prevalence Survey in Nigeria. 2009. Page 1 – 2.

[18] Dibua U. Socio-Economic and Socio-Cultural Predisposing Risk Factors to HIV/AIDs: Case Study Of Some Locations In Eastern Nigeria. The Internet Journal of Tropical Medicine. 2009; 6:2.

[19] Atilola GO, Akpa OM, Komolafe IO.HIV/AIDS and the long-distance truck drivers in south-west Nigeria: a cross-sectional survey on the knowledge, attitude, risk behaviour and beliefs of truckers. J Infect Public Health. 2010; 3(4):166-78. doi: 10.1016/j.jiph.2010.08.002. Epub 2010 Nov 9. Accessed 17 Oct. 16

[20] Andrew AA, Francis K, Mubarak AR, Seth A, Theophilus K, Richard KG et al. Human Immunodeficiency Virus, Hepatitis B Virus and Syphilis Infections among Long-distance Truck Drivers In, A Port City in Ghana. Afr., J. Infect. Dis. 2016; 10 (1): 10 – 16

[21] Singh CM, Verma BL, Dabral M, Agarwal RK, Govil D. A study on Sero-prevalence of HIV/AIDS in some high risk groups of Jhansi, India. Indian J. Prev. Soc. Med. 2004; 35(1): 62 – 67.

[22] Pandey, A., Mishra, R.M., Sahu, D., Benara, S.K., Sengupta, U., Paranjape, R.S., Abhishek Gautam A, Lenka SR, Adhikary R. Heading towards the Safer Highways: An Assessment of the Avahan Prevention Programme among Long Distance Truck Drivers in India. BMC Public Health. 2011; 11: S15.

[23] Delany-Moretiwe S, Bello B, Kiross P, Oliff M, Chersich M, Kleinschmidt I. HIV prevalence and risk in long-distance truck drivers in South Africa: a national cross-sectional survey. Int. J. STD AIDS. 2013; 25 (6):428-38.

[24] Adeoye S. Sexual behaviour, Perception of HIV/AIDS and condom use among commercial motorcyclist in Benin City. Niger Post grad Med J.2005; 12(4):262- 265.

[25] Bryan, A. D., Fisher, J. D. & Benziger, T. J. Determinants of HIV risk among Indian truck drivers. 2001; 53: 1413–1426.

[26] Lawoyin T.O. Condom use with sex workers and abstinence behaviour among men in Nigeria. J R Soc Health. 2004; 124(5):230–233.

[27] Idris SH, Sambo MN, Obi P. Comportment of heavy goods vehicle drivers in HIV spread along settlements around Kaduna: Kano road transport corridor in Nigeria. Int J Med Public Health. 2013; 3:26-32.

[28] Oyedunni S.A, Oladimeji O, Musibau A.T. Perception of self-vulnerability to HIV infection among long distance truck drivers in Ibadan, Nigeria. J. Basic Appl. Sci. Res. 2011; 1(10): 1380-1385.

[29] Gomwalk NE, Nimzing L, Mawak JD, Ladep NG, Dapiap SB, Damshak D, Kim E, Barau C, Jinung JK, Rumtong BM, Agabi YA. Sero-epidemiology of human immunodeficiency virus (HIV) in Plateau State, Nigeria. J Infect Dev Ctries 2012; 6(12):860-869.

[30] Federal Ministry of Health (FMOH). Nigeria Integrated Biological and Behavioural Surveillance Survey 2010. Page 1 – 3.

[31] Utoo, B. T., Utoo, P. M. & Ekwempu, C. C. Profile of HIV voluntary counseling and testing seropositive acceptors in Niger-Delta, Nigeria. J. Public Health Africa. 2012; 3:1-10

[32] Hassan ZI, Afolaranmi TO, Tagurum YO, Bello DA, Jonathan C. Daboar JC, Miner CA, Zoakah AI. Effect of health education on the uptake of HIV counseling and testing among long distance drivers in Jos North Local Government Areas of Plateau State. J Med Trop 2014; 16:97-103.

[33] Yahaya LA, Jimoh AA, Balogun OR. Factors Hindering Acceptance of HIV/AIDS Voluntary Counseling and Testing (VCT) among Youth in Kwara State, Nigeria. Afr. J. Reprod. Health 2010; 14(3): 159-164

[34] Papworth E, Ceesay N, Ann L, Thiam-Niangoin M, Ky-Zerbo O, Holland C, Drame FM, Grosso A, Diouf D and Stefan DB. Review article: Epidemiology of HIV among female sex workers , their clients , men who have sex with men and people who inject drugs in West and Central Africa. Journal of the International AIDS Society. 2013; 16(3):18751

[35] Giami, A. and Le Bail, J. HIV Infection and STI in the Trans Population: A Critical Review. Revue d'Épidémiologie et de Santé Publique. 2011; 59: 259-268.

[36] Bryan, A. D., Fisher, J. D. & Benziger, T. J. Determinants of HIV risk among Indian truck drivers. 2001; 53: 1413–1426.

[37] Lippman SA, Pulerwitz J, Chinaglia M, Hubbard A, Reingold A, Dı´az J. Mobility and its liminal context: Exploring sexual partnering among truck drivers crossing the Southern Brazilian border. Soc Sci Med. 2007; 65:2464 – 2473

[38] Stover J. The global impact of scaling up HIV/AIDS prevention programs in low and middle-income countries. Science. 2006; 3: 223-231

[39] Vian T, Semrau K, Davidson H. H, Loan LTT, Sabin LL. HIV/AIDS-Related Knowledge and Behaviors Among Most-at-Risk Populations in Vietnam. The Open AIDS Journal. 2012; 6: 259-265.