

## Sero-prevalence and risk factors of HIV/AIDS among intra-city commercial drivers in Kano State, Nigeria

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### Abstract

Human immunodeficiency virus (HIV), which is among the world's largest cause of adult mortality, is an excellent example of the link between population mobility and infectious disease. Migrants are at a higher risk of ill health in general and HIV infection in particular. Migrants may be particularly vulnerable to HIV infection, according to epidemiological data from different nations worldwide. The objective of the study was to determine the sero-prevalence and risk factors of HIV among intra-city commercial drivers. A cross-sectional descriptive study design was used. An interviewer-administered questionnaire was used to collect information and blood for HIV testing through multi-stage sampling technique among four hundred and thirty four study participants. The mean and standard deviation of age of the respondents were  $42.0 \pm 11.3$  years. The Sero-prevalence of HIV was 6.7% (95% CI: 3.7-12.6%). On adjusting for confounding effects using logistic regression analysis, 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), 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. Establishment of clinic for treatment of sexually transmitted diseases in a strategic location and effective behavioural change communication strategies were recommended in order to reduce the risk of acquiring HIV infection.

**Keywords:** Human immune-deficiency virus; Intra-city; Commercial drivers; Risk; Sero-prevalence.

### 1. Introduction

Risky sexual behaviours are a crucial contributor in the spread of HIV infection and AIDS [1-3]. HIV infection among intra-city/short-distance drivers is a reason for concern, as these individuals belong to an occupational group that engages in risky behaviors as a result of their work demands [2-3]. Given the significant vulnerability of short distance drivers (SDDs), learning about their sexual attitudes and health-related sexual practices will aid in the development of tailored interventions [1,3]. Globally, people's mobility and migration have exacerbated the HIV/AIDS epidemic, yet their role in spreading HIV differs greatly in terms of documentation. In Nigeria, the proportion of intra-city commercial drivers who were not systematically protected during sex was very high both with casual partners and sex workers [1]. HIV is transmitted mostly through unprotected sexual intercourse with an infected individual [1,4]. HIV infection is

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particularly common near key roadways and in places where natural catastrophes and conflicts have resulted in large numbers of displaced people [4]. Despite the high level of knowledge on HIV/AIDS and the growing awareness of the existence of the risk of HIV infection, condom use and other HIV/AIDS preventive measures always encounters resistance among commercial drivers in Nigeria [1,5].

Furthermore at the end of 2015, an estimated 36.7 million people (34.0 million–39.8 million) were living with HIV worldwide; up by about 20% from 2001 level [6]. The number of people dying of AIDS-related causes fell to 1.1 million (940,000–1.3 million) in 2010, down from a peak of 2.2 million (2.1 million–2.5 million) in the mid-2000s [6]. Much of that success has come in the past two years when rapid scale-up of access to treatment occurred; in 2015 alone, more than 1 million AIDS related deaths were averted [6]. Almost half of the deaths from AIDS-related illnesses in 2010 occurred in southern Africa. AIDS has claimed at least one million lives annually in sub-Saharan Africa since 1998 [6].

Nigeria has the third highest population of people living with human immunodeficiency virus HIV/AIDS globally, only third to India and South Africa [6]. The HIV epidemic in Nigeria has moved from the nascent stage, in which prevalence rate was less than 5% in all subpopulations, through the concentrated stage, in which prevalence rate is more than 5% in high risk populations, to the generalized stage, in which prevalence rate is greater than 5% among women attending antenatal clinics [7]. At present, the results released by the Government of Nigeria indicate a national HIV prevalence of 1.4% among adults aged 15–49 years. Previous estimates had indicated a national HIV prevalence of 2.8%. UNAIDS and the National Agency for the Control of AIDS estimated that there are 1.9 million people living with HIV in Nigeria. While Nigeria's national HIV prevalence is 1.4% among adults aged 15–49 years, women aged 15–49 years are more than twice as likely to be living with HIV than men (1.9% versus 0.9%.) The difference in HIV prevalence between women and men is greatest among younger adults, with young women aged 20–24 years more than three times as likely to be living with HIV as young men in the same age group. Among children aged 0–14 years, HIV prevalence according to the new data is 0.2%. Significant efforts have been made in recent years to stop new HIV infections among children [8]. Even though HIV is now widespread in Nigeria, evidence strongly suggests that regardless of the stage of the epidemic, the most efficient method to reduce the spread of HIV in the general population is to reduce its transmission among high-risk groups [2,5-6]. It is therefore crucial to continue strong HIV interventions targeted at high-risk and bridge populations [2,9]. As of December 2015, 17 million people living with HIV were accessing antiretroviral therapy, up from 15.8 million in June 2015 and 7.5 million in 2010 [6]. The increasing prevalence of HIV among sex workers in Nigeria has been well documented, as evidenced in the national prevalence of HIV among female sex workers (FSWs), which rose from 17.5% in 1991 to 22.5% in 1993 to 36.5% in 1995 and 30.8% in 2010 [7-8].

The vast majority of people newly infected with HIV in sub-Saharan Africa are infected during unprotected heterosexual intercourse (including paid sex) [6]. Having unprotected sex with multiple partners remains the greatest risk factor for HIV in this region [6,10-11].<sup>9</sup> Large proportions of people living with HIV are in long-term relationships—62% in Kenya and 78% in Malawi [10]. In general, transport workers share some common characteristics that are likely to put them at high risk of HIV infection [2,10,12]. These include low level of general education and health knowledge, frequent indulgence in drugs and substance abuse, high use of alcohol, reasonably high level of disposable income and common attitude of fatalism [2,10-12].

HIV infection and AIDS have been widely assessed in the transportation business among long-distance commercial drivers, but not among intra-city commercial drivers. There has been no research on the prevalence and risk factors of HIV infection among intra-city commercial drivers in Kano State, Nigeria, to our knowledge. Because the nature of intra-city commercial drivers' employment differs from that of long-distance drivers, measures to combat HIV infection and AIDS in this occupational category would have to be customized to their specific needs.

## 2. Materials and method

### 2.1. Study Location

The study was conducted in Kano Central Senatorial District of Kano State, Nigeria. 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.

## 2.2. Study Design

A community-based cross-sectional descriptive study design was used.

## 2.3. Study Population

The study population comprises 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 short distance 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. The total sample size used was four hundred and thirty four (434).

## 2.5. Sampling Technique

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 SDDs motor parks/joint who had met the inclusion criteria was obtained. There were seventy four SDDs motor park/joint, out of which twenty SDDs 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/joints of SDDs.

## 2.6. Study Instruments

A semi-structured interviewer administered questionnaire, consisting of 3 sections (A to C) was used for data collection in the study.

## 2.7. Measurement of Variables

The outcome variable measured was Sero-prevalence and some selected risk factors of HIV/AIDs among the study participants. All the data generated from the study was analyzed using SPSS.

## 2.8. Ethical Considerations

Ethical clearance was obtained from the ethical committee of Kano State Ministry of Health and Ahmadu Bello University Zaria before commencement of the study. The provisions of the HELSINKI declaration were respected.

## 2.9. Limitations

- Because participation was entirely voluntarily, those who have many risk factors of HIV/AIDs were less likely to participate making the research 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 the study participants

The mean age and standard deviation of the study participants was  $42.3 \pm 11.3$ . About three-quarter (73.7%) of the study participants were below the age of fifty years (20-49 years): this age group is very active productively and reproductively. Nearly half (47.6%) of the study participants had educational status of secondary school and beyond. About half (50.2%) of the study participants were married, out of which nearly three-quarter (73.3%) were polygamous i.e had more than one wife. Nearly, two-third (65.1%) of the study population had monthly income of more than one thirty thousand naira. Other socio-demographic variables were indicated in table 1.

**Table 1** Socio-demographic profiles of study participants

Variables	Frequency	Percentage
Age (years)		
20 – 29	62	14.8
30 – 39	137	32.8
40 – 49	109	26.1
50 – 59	62	14.8
60 – 69	48	11.5
Educational Status		
Non-formal	76	18.2
Primary	143	34.2
Secondary	154	36.8
Post-secondary	45	10.8
Marital Status		
Single	164	39.2
Married	210	50.2
Separated	30	7.2
Divorced	14	3.3
No of wives		
1	67	26.8
>1	173	73.2
Monthly Income		
<N30,000.00	146	34.9
N30,001.00 – 50,000.00	193	46.2
N50,001.00 – 100,000.00	51	12.2
>100,000.00	18	4.3
Working Experience		
<5 years	163	40.0
5 – 10 years	162	38.8
11 – 20 years	61	14.6
>20 years	40	9.8

### 3.2. Sero-prevalence of HIV among the study participants

The Sero-prevalence of HIV/AIDS among the study participants was found to be 6.7% i.e more than three times the national average for Nigeria (Table 2).

**Table 2** Sero-prevalence of HIV among study participants

Screening Test Result	Frequency	Percentage (%)
Positive	28	6.7
Negative	390	93.3
<b>Total</b>	<b>418</b>	<b>100</b>

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

Nearly three-quarter (74.6%) of the study participants had more than one sexual partner in the last twelve month preceding this study. About one-quarter (24.6%) of the study participants engaged in extra-marital sex out of which more than half (58.1%) of them used condom regularly during the last twelve month preceding this study. Almost one quarter of the study participants engaged in sex under the influence of drugs and or alcohol. Other identified risk factors among the study participants include history of blood transfusion and history of genital ulcers or urethral discharge. On the protective factors, only about a quarter among the study participants had participated in HIV/AIDS preventive campaign measures prior to this study. Other protective measures include regular use of condom as stated earlier (Table 3).

**Table 3** Risk and protective factors of HIV/AIDS among study participants

Variables	Frequency	Percentage (%)
No of sexual partners in the last twelve month		
1	106	25.4
>1	312	74.6
Regular use of condom during extra-marital sex	243	58.1
Previous participation in HCT/VCT	195	46.7
Age at first sexual intercourse		
≤25 years	103	24.6
>25 years	315	75.4
Sex under the influence of drugs or alcohol	106	25.4
History of extra-marital sex in the last twelve month	103	24.6
History of blood transfusion in the past	16	3.8
History of genital ulcers or urethral discharge	43	10.3
Previous participation in HIV/AIDS preventive measures campaign	140	33.5

Among the study participants, there was a statistically significant association between HIV status & marital status, monthly income and working experience. Those who were married had lowest proportion of HIV positive respondents. As income and working experiences increases the chances of becoming HIV positive also increases (Table 4).

**Table 4** Relationship between Socio-demographic variables and HIV status

Variables	HIV status		$\chi^2$	p-Value
	Yes	No		
Age (years)				
20 – 29	6	47	7.89	0.0959
30 – 39	15	109		
40 – 49	12	104		
50 – 59	10	87		
60 - 69	8	27		
Educational Status				
Non-formal	6	56	1.81	0.7707
Primary	9	128		
Secondary	6	103		
Post-secondary	5	57		
Marital Status				
Single	11	153	24.88	0.00002
Married	7	203		
Divorced	5	25		
Separated	5	9		
No of wives				
1	10	57	0.96	0.3278
>1	18	155		
Monthly Income				
<N30,000.00	7	139	18.51	0.0003*
N30,001.00 – 50,000.00	9	184		
N50,001.00 – 100,000.00	7	44		
>100,000.00	5	13		
Working Experience				
<5 years	5	158	33.14	<0.0001
5 – 10 years	5	157		
11 – 20 years	10	51		
>20 years	8	24		

\*Statistically significant difference

Furthermore, After adjusting for the confounding effects using logistic regression analysis; 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 51** Multivariate (Logistic Regression) Analysis of predictors of Sero-prevalence of HIV/AIDS among study participants

Predictor(s)	Crude OR (95% CI)	Adjusted OR (95% CI)	sp-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			
No	Referent		
Yes	0.17 (0.06 – 0.45)	0.24 (0.09 – 0.61)	0.00003*
Previous participation in HCT/VCT			
No	Referent		
Yes	0.14 (0.04 – 0.43)	0.23 (0.09 – 0.58)	0.0258*
Sex under the influence of drugs or alcohol			
No	Referent		

Yes	6.18(2.59 – 14.78)	3.98 (2.04 – 12.43)	<0.001*
History of extra-marital sex	Referent		
No	9.25 (3.7 – 23.80)	4.97 (2.53 – 11.82)	<0.001*
Yes			
History of genital ulcers or urethral discharge	Referent		
No			
Yes	8.23 (5.08 – 13.41)	2.03 (1.16 – 8.92)	0.7649

\*Statistically significant difference

#### 4. Discussion

Transport is a social vector in the transmission of HIV as well as other high risk behaviours such as injecting drug use and commercial sex that fuel the epidemic. Transport sector workers are twice as likely to acquire the HIV infection as workers in 'low-risk' occupations [1,9]. And, available literature on HIV risk factors has documented the relationship between mobility and HIV spread in sub-Saharan Africa [1, 9, 11, 14]. Migrants' sexual relationships with multiple partners in destination areas are assumed to be the main factor explaining the role of migration in the spread of HIV and other STIs [9,14]. The drivers are heterosexual transmitters of HIV mostly occurring along major highway transport nodes within the country, that have links with countries of Middle Africa where the AIDS epidemic is at a more advanced stage [9,13]. Studies from different parts of the world suggested that migrants and other mobile individuals act as bridge populations who spread the infections from high-risk to low-risk populations and regions as well as urban to rural areas [16,19-22].

The Sero-prevalence of HIV among the study participants was 6.7%, which is about five times the current national average in Nigeria. This finding contrast that by Atilola et al, who reported the Sero-prevalence of HIV of 2.4% among LDDs in South-Western Nigeria, which is almost one that of this, although their finding was among different category of transport workers ie LDDs [20].<sup>29</sup> But, it was close to findings by Azunwo in Port Harcourt who reported 10% [23]. 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 [11,24-25]

The risk for HIV transmission increases with a higher number of sexual partners, especially when these partners are from high risk groups [18-19,26] Those who had 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 the study participants. Extra-marital sex was found to be an important risk factor for HIV sero-positivity, as study participants who engaged themselves in extra-marital sex were four times at risk of being infected with HIV respectively, as reported in other studies [18-20, 22, 26]. More than half of the study participants use condom in the last twelve month. This is 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 [17]. But, a finding by Idris on use of condom among transport workers was 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 [20-21, 23, 25-27].The practice of safer sex with the use of condoms can prevent HIV transmission especially among those with multiple sexual partners [25-27].

Previous studies have reported that participation and uptake of HCT/VCT was found to decrease the risk of HIV infection among participants more especially those at high risk group [18,27,29-30]. In this study, only two-fifth of the study participants have ever participated in HCT/VCT. Finding of this study with regards to uptake of HCT was slightly higher than findings of Hassan et al in Jos [30]. This low uptake of HCT among the study participants has a serious implication on transmission of HIV [29-30].

The risk of HIV infections increases from age 20 – 39 years and after that start decreasing gradually. In this study about 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 [28]. It was reported that in this study, nearly one quarter of the study participants had sexual



intercourse under the influence of drugs or alcohol [18]. Sex under the influence of drugs or alcohol may make someone not to adequately protect himself/herself.<sup>18</sup> This can make someone more vulnerable and further promote infections with sexually transmitted diseases [5,18].

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## 5. Conclusions

The Sero-prevalence of HIV/AIDs was 6.7% among the study participants: this is nearly five times the national average and thus making the study participants as highly risky (special) group of people in our society. The risk and protective factors identified in the study include educational status, marital status, high monthly income, history of extra-marital sex, use of condom in the last twelve month preceding the study and previous participation of HIV/AIDs preventive measures campaign. Knowing these risk factors will help in addressing the problem of high prevalence of HIV/AIDs among the study participants. There is an emergency need for instituting appropriate HIV/AIDs preventive measures among this special group of population in the society that serve as an important risk source for further spreading HIV. Preventive activities should include establishing of STIs clinics in strategic location as well as making condom available, accessible, affordable and acceptable for use by this category of population. Appropriate measures need to be taken by government and all the relevant stakeholders to educate this occupational group in order to modify their sexual behaviors.

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## Compliance with ethical standards

### *Acknowledgments*

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### *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, analysis and interpretation of data as well as drafting the article for intellectual content
- Dr Abubakar Muhammad Kurfi-contributed in the analysis, discussion and interpretation of data. Also revises the article critically
- Dr Jibin Adamu Damazai participated from conceptualization of the research ideas up to analysis and interpretation of research findings. Also participated in drafting the articles for intellectual content
- Dr Gana Muhammad Lawan- contributed in discussion and interpretation of study findings.
- Dr Adamu Abdullahi Atterwahmie-contributed in the analysis, discussion and final writing of the manuscript.
- Dr Aliyu Muhammad Maigoro- contributed in data collection, data analysis, discussion and interpretation of study findings.
- Dr Adam Ibrahim Abdullahi- contributed in the review and final draft of the manuscript .

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