

**Seroprevalence of HIV among the People of Lake Chad Basin of Borno State, Nigeria.**

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**Abstract**

The seroprevalence of HIV in the general population among the vulnerable priority group and high risk populations in the Conventional Lake Chad Basin (CLCB) has not been documented. This study therefore is aimed at determining the prevalence of HIV among the general population of the people living on the islands and hinterlands of the Lake Chad Basin of Borno State. A total of one thousand, seven hundred and ninety people were counseled and tested for presence of HIV antibodies. This include the general population from both the island and the hinterland, the prison inmates, uniformed men, long journey drivers both on the island and hinterland, commercial sex workers and traders from the island. Blood sample was collected by finger-pricking and tested for the presence of HIV antibody using Determine HIV-1/2 Test Cards, Unigold HIV test kit and Stat Pak HIV-1/2 test kits. Each sample was screened with Determine test kits. Those samples that were reactive were confirmed using Unigold test kit. The discordant results were resolved using Stat Pak test kit. Every tenth sample from the positive individuals was retested for quality assurance using the blotted dry blood sample collected from the field. The overall prevalence in the study area was estimated to be 24.1%. The target group with the highest prevalence was commercial sex workers (CSW) (40.1%), followed by general populations (32.3%). The transporters had prevalence of 24.6% and prevalence among uniformed service men was 20.2%. The prevalence among traders was 18.2% and island populations 16.9%, while the prison inmates had 14.5%. HIV-2 was not detected in this study. However only two people were tested among the displaced people and none was positive. The study shows a highly generalized epidemic with CSW serving as a potential reservoir of infection in the midst of a significantly mobile population without intervention strategies.

**Keywords:** seroprevalence, CSW, HIV, Borno

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**Introduction**

Human immunodeficiency virus (HIV) infection remains a global problem with approximately 33 million people living with HIV and 1.8 million deaths from AIDS in 2009 [28]. It is a degenerative disease of the immune and central nervous systems which makes the human body prone to life threatening opportunistic infections and malignancies. So far, no outright cure for

the disease has been found. The threat to global health by this dreaded disease has prompted concerted responses and reactions of the World Health Organization (WHO), various governments in the world, non-governmental organizations and individuals such as Bill Gates [2].

Sub-Saharan Africa remains the most heavily affected region, accounting for about 71% of all



new HIV infections in 2008. There are two related but distinct types of HIV: HIV-1 and HIV-2 [7]. HIV-1 is the most pathogenic and causes over 99% of HIV infections [24]. HIV-2 is also known to cause AIDS but is much less prevalent, being present in fewer and isolated geographic locations such as West Africa [22]. Nigeria's epidemic is characterized by one of the most rapidly increasing rates of HIV and AIDS cases in West Africa [30]. Several factors have contributed to the rapid spread of HIV in Nigeria. These include sexual networking practices such as polygamy, a high literacy level, poor health status and low economic status of women, stigmatization, and denial of HIV infection among vulnerable groups. Nigeria is a complex mixture of diverse ethnic groups, languages, cultural practices, religions, and regional political groupings, all of which are major challenges for HIV prevention programs [27] [29] [30]. Also, lack of accurate information about sexual health has contributed to the spread of myths and misconceptions about sexual intercourse and HIV, thereby contributing to increasing transmission rates, as well as, stigma and discrimination towards people living with the virus [25] [26]. This study however, was aimed at determining the prevalence of HIV among the high risk groups such as commercial sex workers, long journey drivers, traders, prison inmates, uniform men and general population in Lake Chad basin of Borno State, Nigeria

## Materials and Method

### Sample Population

A total of one thousand, seven hundred and ninety (1790) people were counseled and tested for presence of HIV antibodies from the residents of seven Local Government areas of the Lake Chad Basin of Borno State, Nigeria. This include the general population from both the island and the hinterland, the prison inmates, uniformed men, long distance drivers both on the island and hinterland, commercial sex workers and traders from the island. The respondents were informed of the study objective during counseling, and consent was sought for voluntary participation.

**Ethical Considerations:** Ethical clearance and approval for the study was sought from the Ethical Committee of University of Maiduguri Teaching Hospital, Maiduguri in accordance with the code of ethics for biomedical research involving human subjects. The participants were sufficiently counseled and informed consent obtained with the assurance that all information would be treated with utmost confidentiality.

### Blood Sample Collection

For each study subject, identification information was written on a filter paper by the team technician followed by selection of one of the 2 middle fingers which was thoroughly cleansed with alcohol wipe and allowed to air dry a few seconds. A sterile, disposable lancet was used to puncture the skin to the side of the finger tip. The first small blood drop was wiped away with a gauze pad. All the blood samples were blotted on Dried Blood Sample Card (Protein Saver™ 903™ Card by Whatman™. LOT 6834509/83). This was done by placing it close to the pierced surface without touching and then followed by application of gentle pressure to the base of the finger and the second large blood drop was allowed to fall from the tip of the finger onto the surface of the filter paper inside of the circles. The circles were completely filled with a single drop before moving to the next empty circle. Blood was applied to one side of the filter paper (the side with printing) until all circles are filled. The DBS samples were dried under atmospheric temperature. The samples for the rapid HIV test were collected using capillary tubes. Two of the capillary tubes were used to collect blood sample from each participants. The tube was brought close to the base of the blood drop and filled gradually to the upper mark to avoid spillage if over filled.

### Sample Analysis

Testing for the presence of HIV antibodies was carried out with Determine® HIV-1/2 Test Cards (Inverness Medical, Japan), Unigold™ kit (Trinity Biotech, Ireland) using serial algorithm according to manufacturer's instruction. Each sample was screened for the presence of HIV-1/2 antibodies using Determine test kits and the



samples reactive to HIV1/2 antibodies were then confirmed using Unigold test kit.

#### **Packaging Blood Spots and Storage**

Once DBS were completely dry, they were stacked between sheets of glassine paper to prevent blood spot cards from different patients touching each other. Ten-fifteen blood spot cards were packed in low gas permeable zip-lock bags and 5-10 desiccant packs for removal of any residual moisture from the cards and humidity indicator cards (HI CARD MS20003-2, Batch 0123590C, USA) for measurement of relative humidity inside the bag were added.

The DBS cards were kept in zip-lock bags with desiccant and stored at 4°C until ready for shipment. The DBS cards were shipped to Virology Unit of the Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja where they were kept at 4°C.

#### **Elution of the dried blood spots**

The DBS were punched using 6mm file puncher into 5ml disposable tubes and 200µl of the elution buffer was added to each of the tubes.

The diluents were carefully mixed three times using the pipette to ensure that the discs were completely submerged. 50 tubes of the known positive and known negatives as described above were incubated at 2°C to 8°C while the

other 50 were incubated at room temperature under normal laboratory conditions.

#### **Confirmatory Test and Differentiation of the HIV types**

For the purpose of quality assurance every tenth negative sample was retested using Gen Screen Ultra HIV Ag-Ab (Bio-Rad Laboratories Inc) and all positive samples were retested using HIV Immunocomb 1&2 Bispot (Organics Ltd, Israel) to differentiate between HIV 1 and HIV 2 according to the manufacturer's instructions.

#### **Result**

A total of one thousand, seven hundred and ninety persons were counseled and tested for HIV-1 &2 in the Lake Chad Basin of Borno State Nigeria. The result of the study revealed that four hundred and thirty one (431) representing 24.1% with a 95% confidence interval of 22.1 – 26.1 tested positive for HIV-1 and none was HIV-2 positive. The highest HIV prevalence was observed in Abadan where 74(69.8%) out of 106 people tested were found to be infected with HIV-1. A total of two hundred and fifty five people (255) were tested in Dikwa 73(28.6%) were HIV-1 positive, while Kukawa has a prevalence of 74 (22.6%) out of 907 people tested. Jere came next with a prevalence of 17.1% while Maiduguri Metropolitan City had the lowest seroprevalence of 13.6% (Table 1).

**Table 1: HIV Seroprevalence disaggregated by local government area**

Local Government Area	Number of Samples	Number Positive	Prevalence (%)
Abadan	106	74	69.8
Dikwa	255	73	28.6
Jere	252	43	17.1
Kukawa	907	74	22.6
Maiduguri Metropolitan City	265	36	13.6
Marte	2	0	0
Ngala	3	0	0
Overall prevalence	1,790	431	24.1

The study was disaggregated by target groups. The target group with the highest prevalence

was found to be the commercial sex workers (40.1%), followed by household populations



(32.3%). The transporters had prevalence of (24.6%) and prevalence among uniform service men was 20.2%. The prevalence among traders was 18.2% and among island populations it was 16.9%.

The lowest prevalence was observed among prison in mates (14.5%). However only two people were tested among the displaced people and none was positive (Table 2).

**Table 2: HIV seroprevalence disaggregated by target groups**

Target Group	Number of Samples	Number Positive	Prevalence
Household	393	127	32.3
Traders	358	65	18.2
Transporters	346	85	24.6
Uniform servicemen	173	35	20.2
Refugees/Displaced	2	0	0
Island Population	307	52	16.9
Commercial Sex Worker	142	57	40.1
Prisoners	69	10	14.5

Table 3 shows the age related distribution of the prevalence of HIV. The prevalence of HIV-1 was seen to be higher among respondents in the age interval 15–19 years 50 (30.9%), and respondents in the age interval of 30–34 years had prevalence of 87(26.9%), followed by respondents in the

age interval of 40–49 years (25.0%), then the age interval of 40–44 years (24.2%). The next most affected age intervals were 25–29 years (23.3%), 20–24 years (21.3%) while 35–39 years had the least prevalence of (19.9%).

**Table 3: Age related distribution of the prevalence of HIV**

Age Group (year)	Number of Samples	Number Positive	Prevalence (%)
15-19	162	50	30.9
20-24	385	82	21.3
25-29	386	90	23.3
30-34	324	87	26.9
35-39	196	39	19.9
40-44	161	39	24.2
45-49	176	44	25.0

Out of three hundred and fifty one (351) of the urban population tested in this study, fifty one (51) representing (14.5%) tested positive while three hundred and eighty (26.4%) from one thousand four hundred and thirty nine rural populations tested were found to be HIV-1 positive. The study showed that the prevalence of HIV is significantly higher in the rural areas

(26.4%) compared to urban settlements (14.5%) ( $P < 0.001$ ) (Figure 1).

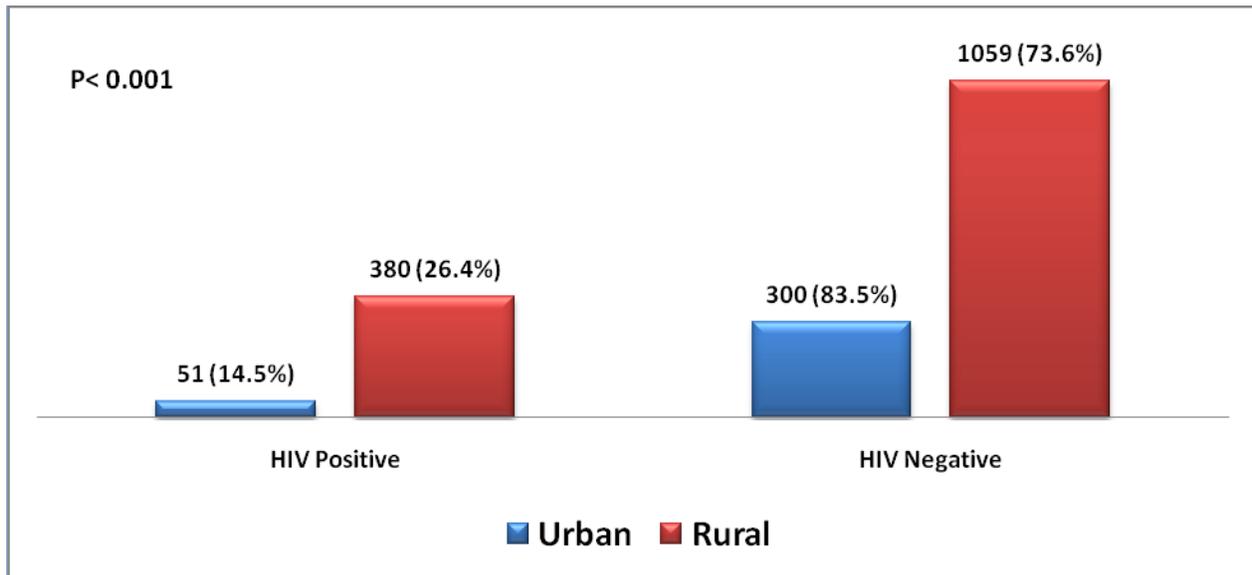


Figure 1: Prevalence of HIV disaggregated by urban and rural areas

On disaggregation of prevalence of HIV by gender from Lake Chad Basin, it was revealed that there was no significant difference in

prevalence of HIV by gender (24.1% for both male and female) from this area (Figure 2).



Figure 2: Prevalence of HIV disaggregated by gender

**Discussion**

The behavioural and HIV seroprevalence survey of the Nigerian portion of the Lake Chad basin provided several new insights into the current state and potential future direction of the HIV epidemic in the Lake Chad basin.

The mainland communities constitute the majority of the population as compared to the island population which is indicative of a more settled and permanent population group. However the involvement of significant



respondents (36.9%) from migratory population (transportation sector (19.3 %), Uniform services (9.7 %), Commercial Sex Workers (7.9 %)) also means that a significant part of the Basin's population is non-permanent and potentially mobile with the attendant potential of serving as a source of transmission of infection in and out of the basin. Only a small refugee population (0.1%) currently exists as the only refugee camp within the Nigerian portion of the Lake Chad basin located at Ngala was found virtually empty.

The population dynamics and the social life style of the islands of the Lake Chad basin does not only separate the Islands from the rest of the state but also distinguishes it as 'urban-villages' with a unique way of life. A scenario that involves people staying away from their families for a long time and having substantial disposable income in the midst of a poor rural environment with a relatively young population and a booming sex industry no doubt exposes the entire community to the practice of high risk behaviours. This in turn predisposes them to STDs and HIV/AIDS. Also war, internal strife, and movement of refugees and population desolation for any reason are major routes that enhance the spread of HIV-1.

Global experience has shown that the spread of HIV infection from these key populations to the general population can occur rapidly when such populations lack access to prevention and treatment services. Individuals engaged in high-risk practices can transmit the infection to their spouses and other sexual partners [9].

Review of HIV prevalence in Nigeria showed a gradual increase from 1.8 to 5.8% between 1986 and 2001 [6]. In this study, HIV prevalence was 24.1%. This is similar to a seroprevalence study of HIV among farmers and non-farmers in Kogi State Nigeria which showed a prevalence of 22.7% [17]. The study showed that 44.9% of the farmers were HIV positive while 14.6% of the non-farmers were positive [17]. Specific risk behaviours and practices are responsible for the spread of HIV/AIDS.

It was noted that geographic variations in HIV prevalence may be due to previous hubs of sexually transmitted infections (STIs) or urban

development in Nigeria. High HIV infection prevalence of 24.6% in this study may be due to the nature of the socioeconomic life style of the people of this region who are mainly fishermen and transporters [1]. A study conducted in Uganda among long distance truck drivers revealed a similar result of HIV prevalence between 25% and 32%. The same study demonstrates that long distance truck drivers are at a higher risk of contracting HIV than the general population [12]. A study conducted at Sainte-Justine Hospital, Canada had a general prevalence rate of 81.0% among pregnant women receiving prenatal care. This is quite alarming. It is apparent that pregnant women are involved in unprotected sexual intercourse leading to pregnancy. This could account for the high prevalence rate among this group [3].

Variables between the target groups were noted in this study. HIV prevalence in this study varied from 40.1% among CSWs to 14.5% among prison inmates. The result of this study showed a varied HIV prevalence of 14.5 and 26.5 between urban and rural communities. This is similar to a study that reported varied HIV infection rates from 5.4 to 13.6% in the urban and semi urban study locations [19].

The prevalence of 24.1% was recorded among both the male and female populations in this study which is similar to a study by Olaleye *et al* [19] which revealed HIV prevalence of 24.6% among male and 21% among female population. A cross sectional study revealed that 18 (9.0%) out of 200 patients attending the Association for Reproductive Family and Health (AFRH) Centre in Ibadan Nigeria, randomly selected and tested to determine the prevalence of HIV, using conventional methods was positive for HIV [16]. A significant higher infection rate observed among people with age group of 15 - 49 years in this study is comparable to results of previous studies and HIV national sentinel survey [5, 6, 8]. In a different study, HIV prevalence of 7.1 % among people aged 16-29 years and 10.8% among people above 30years of age was reported [16].

Prevalence figure of 14.5% was recorded among the uniformed men in this study and is comparable to the figures of 12% among the



prison inmates in Kaduna [23]. The figure is also lower than the figures reported amongst inmates in South Africa (15%), Spain (16.4%), Cote d'Ivoire (27.5%), Zambia (26.7%) but higher than France (13%), Netherlands and Switzerland (11% each) [10] [11] [13] [14] [4]. HIV prevalence in the prisons is usually higher than that in the population at large. It could be 5, 6, or even as much as 10 times higher than the values obtained in the general population [23].

In this study, HIV-2 antibody was not detected though human immunodeficiency virus type 2 (HIV-2) is an important cause of disease in a number of regions of the world. HIV-2 is found to be largely restricted to West Africa where its prevalence rate is still very low [8].

### Conclusion

This study revealed a varied prevalence at different locations within Borno State, Nigeria. The variation is also evident among the rural and urban population. The rural dwellers had the highest epidemics compared to the urban population. On disaggregation by target groups, the study showed sub-epidemics among target groups with commercial sex workers leading the group. The study also showed different rates of HIV infection among age groups with age group of 15-19 having the highest prevalence. There was no difference in the prevalence among the male and female population. HIV-2 was however not detected in this study.

It is therefore very important that concerted effort be taken by all stakeholders to reduce the epidemics.

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