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# SEROPREVALENCE OF HIV INFECTION AMONG BLOOD DONORS AT THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL, RIVERS STATE, NIGERIA

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## Abstract

The aim of this study was to determine the seroprevalence of HIV infection among blood donors visiting the University of Port-Harcourt Teaching Hospital (UPTH) and also to determine the types of blood donors, the age range and sex of HIV positive blood donors. A total of 880 blood donors were screened for Human immunodeficiency virus (HIV) antibody. They were 833 males and 47 females. Their ages ranged from 17 – 56 years. Questionnaires were given to the participants to fill before their blood samples were collected by a trained nurse. The HIV screening was carried out at the HIV laboratory using Determine HIV 1 and 2 and stat-pak. A total of four blood donors (0.45%) were positive for HIV antibodies. In the age range of 27 - 36 years, 1 male (0.115%) and 1 female (0.115%) were positive. In the age range of 37 - 46 years, 1 male (0.11%) was positive whereas between the age of 47 - 56 years, 1 male (0.11%) was also positive. Family replacement donors were 879 (99.9%) and voluntary donor was 1 (0.1%). Commercial remunerated donors showed zero prevalence. These results showed a low prevalence of HIV antibodies among blood donors in the studied population and a high rate of family replacement donation. Recipients have an increased risk of becoming infected with HIV through blood or blood products that is not tested or not properly tested. Voluntary remunerated donors should be encouraged and the search for same should be intensified.

***Key words:*** Blood Donors, Seroprevalence, Human Immunodeficiency virus, Demographic profile, Sex Distribution.

## Introduction

Human immunodeficiency virus (HIV) is a Lentivirus, a member of the retrovirus family that can lead to acquired immunodeficiency syndrome (AIDS) a condition in humans in which the immune system begins to fail, leading to life threatening opportunistic infections (Rick,1999).

HIV has continued to pose a great challenge to transfusion medicine, most especially in Africa due to a high transfusion demand (Fleming, 1997 and Fleming, 1990). Since the discovery that HIV is transmitted through blood transfusion it became necessary to test all intending blood donors for HIV infection before they are bled to ensure the safety of all blood and blood products to the recipients (Fleming, 1997). Nigeria with a HIV seroprevalence of 5% by 2004 has the third largest population of people living with HIV/AIDS in the world (Federal Ministry of Health, 2003 and UNAIDS, 2005).

HIV infection resulting from blood transfusion has been documented repeatedly since the first case report in late 1982 (Curran *et al.*, 1984). HIV transmission through unsafe blood accounts for the second largest source of HIV infection in Nigeria (Federal Ministry of Health, 2009). Not all Nigerian hospitals have the technology to effectively screen blood and therefore there is a risk of using contaminated blood. The Nigerian Federal Ministry of Health have responded by backing legislation that requires hospitals to only use blood from the National Blood Transfusion Service, which has far more advanced blood-screening technology (Nigeria Exchange, 2008).

The four main routes of transmission are through blood and blood products, contaminated needles, unprotected sexual intercourse, and mother to child transmission (Rick, 1999). The virus infects cells bearing the CD4 antigen receptor, the most important being T- lymphocytes. These cells regulate cellular and humoral immunity by interacting with other T lymphocytes, B lymphocytes, macrophages and natural killer cells.

Human immunodeficiency syndrome remains a public health problem of major significance in the world today. In Nigeria, an estimated 3.6 % of the populations are living with HIV and AIDS (UNGASS, 2010).

The groups at increased risk of acquiring HIV infection in Nigeria are mainly heterosexuals; approximately 80-95% of HIV infection in Nigeria is as a result of heterosexual sex (UNGASS, 2010). HIV transmission through unsafe blood account for the second largest source of HIV infection in Nigeria (Federal ministry of Health, 2009). It has been reported that blood transfusions account for up to 10 % of new HIV infections in Nigeria (FMOH, 2009). Not all Nigerian hospitals have the technology to effectively screen blood and therefore there is a risk of using contaminated blood. Millions of lives are saved each year through blood transfusion. Nevertheless, people have an increased risk of becoming infected with HIV and other infections such as hepatitis B and hepatitis C, through transfusion of blood and blood products that have not been tested correctly (UNAIDS, 1997).It is estimated that between 5% and 10% of all HIV infections worldwide were acquired through transfusion of contaminated blood and blood products (UNAIDS, 1997). Blood donation occurs when a healthy person voluntarily gives blood. The blood is used for transfusion. The increasingly recognized problem of inadequate efficacy of transfusion and post transmission complications raises the importance of quality testing and screening (Marik and Corwin, 2008). However, this study was undertaken to determine the

seroprevalence of HIV infection among blood donors visiting the University of Port-Harcourt Teaching Hospital (UPTH) and also to determine the types of blood donors, the age range and sex of HIV positive blood donors.

## Materials and Methods

### Sample Population

A total of 880 blood donors (833males and 47 females) of different ages and socioeconomic status visiting the Department of Blood Bank and Transfusion, University of Port-Harcourt Teaching Hospital, Port Harcourt, Southern Nigeria for the purpose of blood donation were enrolled in this study. The study was conducted from January to March 2010 by recruiting consecutive consenting blood donors presenting at medical centre until a total of 880 participants was attained. Other relevant information of all participants was obtained using a Performa specially designed for this purpose. The study was approved by the ethical review committee of the hospital. All work was performed according to the International Guidelines for Human Experimentation in Clinical Research. Table 3 summarizes the demographic characteristics of the blood donors in University of Port Harcourt Teaching Hospital, Alakahia Port Harcourt, Southern Nigeria used in this study.

### Study Location

The University of Port Harcourt Teaching Hospital (UPTH) is one of the 3rd generation Teaching Hospitals established by law in 1985 via Decree No. 10 of 1985, though it commenced operation in 1980. It is one of the major tertiary health institutions in the Oil-rich Niger Delta Region of Nigeria. It is the apex health institution in Port-Harcourt, which is the headquarters of the oil-industry and the second most industrialized city in Nigeria. As such, it caters for a large cosmopolitan population of indigenous and expatriate oil-sector employees, who are largely in the upper socio-economic strata and therefore require advanced modern medical care as obtainable elsewhere in developed countries. This scenario places a great developmental burden on the University of Port-Harcourt Teaching Hospital (UPTH), which must therefore strive to meet international standards in all specialties and sub-specialties of medical care. They provide medical care of sufficient standard that is comparable to international best practices which would result in much capital flight and wastage of our hard-earned foreign exchange for medical care abroad.

It becomes imperative, therefore, that the apex health institution in Rivers State, i.e. UPTH, operate at standards comparable to the best centres internationally, as the private health sector is not yet in a position to meet these needs because of the heavy capital outlay involved. The University of Port-Harcourt Teaching Hospital is located at Alakahia Port-Harcourt.

### Mobilization of Blood Donors

The chief medical laboratory scientist of the University of Port Harcourt Teaching Hospital was notified of this study. This was done for easy asses to the blood donors visiting the blood bank unit. Blood donors who participated were educated on the importance of blood donation and the risk of transfusion transmissible infection. Thereafter the blood donors gave their consent.

### Sampling Procedure

A total of 880 questionnaires were administered to blood donors who visited the University of Port-Harcourt Teaching Hospital and further subjected for statistical analysis. The method of data collection employed was by structured questionnaire. Data was obtained by quantitative methodology using structured questionnaires on the days of their medical examinations. Confidentiality of the process was adequately explained to each participant, who was then given a number and the numbers were used on the forms instead of names.

Information was obtained on their demographic profile (age, sex marital status, state of origin), sexual history and health status. This information was obtained by personal assisted interview techniques using a standardized questionnaire from National blood transfusion service. This was followed by blood collection by a medical officer using a sterile syringe. The blood sample was later transferred into anticoagulant bottles. The bottles were arranged in a collection box and sent to the Hematology laboratory at the University of Port Harcourt Teaching Hospital for HIV antibody screening. The specimen was allowed to settle to separate the serum which was used for the screening. Privacy and confidentiality was observed as well as strict aseptic measures.

All data generated was presented in Tables and subjected to statistical analysis (the P2-test, with the level of significance set at $p < 0.05$ using statistical package for social sciences (SPSS) to determine any significant relationship between HIV awareness, age and gender.

### HIV Antibody Testing

A World Health Organization (WHO) approved kits known as ‘DETERMINE® HIV-1/2 (Abbott laboratories) and HIV- 1/2 STAT-PAK® (Chembio Diagnostic Systems, Inc.)’ were used for qualitative and differential detection of antibodies to HIV 1 and 2 in human serum. The kit contains 10 HIV 1 /2 recombinant antigen and synthetic peptide coated test strips. A Pasteur pipette was used to place a drop of serum aseptically on the HIV strip. After 30 minutes a double line colour change indicated a positive result, further supplementary test with HIV-1/2 Stat Pak assay, which is a single-use Immunochromatographic rapid screening test, was used for a confirmatory result. A single colour change indicated a negative result.

## Results

### Age and Sex Distribution of HIV Antibodies Among Blood Donors

A total of 880 blood donors were screened for HIV antibodies over a period of three months between January and March 2010. Out of which 4 (0.45%) were positive for HIV antibodies comprising of 3 males (0.34%) and 1 female (0.12%). Their age ranges from 27 - 36 years; male 1 (0.12%), and female 1(0.12%), 37 - 46 years; male 1 (0.11%), 47 - 56 years; male 1 (0.11%) as shown in Table 1.

### Types of Blood Donors

Of the 880 blood donor tested, 879 (99.9%) were family replacement donors, 1 (0.1%) was voluntary donors. No commercial remunerated donor was observed in this study. This is reported in Table 2.

### Demographic Profiles of Blood Donors

Blood donors tested were predominantly males 833 (94.7%) compared to females 47 (5.3%). The blood donors ages ranged from 17 - 56 years and more donors were seen from the age range of 37 - 46 years, 486 (53.1%) and the least from 17 - 26 years, 10 (0.8%) as shown in Table 3.

### Sexual History of Blood Donors

Blood Donors who attested to having had sex in the last few months with someone they were not sure about were 376 (43%). Also those who had sexually transmitted infection in the last year were 100 (11%) (Figure 1).

### Health Status

A total of 748 (85%) of the blood donors claimed to be in good health condition as at when interviewed. Ninety (10%) acknowledged they had a swollen gland. The number of blood donors who have been given a blood transfusion before were 250 (28%). Ninety (10%) of the blood donors have night sweats. Among those screened, 234 (27%) wished to be told the result of the HIV test performed on them (Figure 2).

**TABLE 1: AGE AND SEX DISTRIBUTION OF HIV ANTIBODIES AMONG BLOOD DONORS**

| Age (Years) | Number screened | Number Positive | Sex Distribution of Positive Donor | |
|---|---|---|---|---|
| | | | Males (%) | Females (%) |
| 17 – 26 | 10 | Nil | Nil | Nil |
| 27 – 36 | 309 | 2(0.23%) | 1(0.12%) | 1(0.12) |
| 37 – 46 | 486 | 1(0.11) | 1(0.11) | Nil |
| 47 – 56 | 75 | 1(0.11) | 1(0.11) | Nil |
| **Total** | 880 | 4(0.45) | 3(0.34) | 1(0.12) |

**TABLE 2: TYPES OF BLOOD DONORS**

| Donors Status | Total Number | Percentage (%) |
|---|---|---|
| Commercial Remunerated | Nil | Nil |
| Family Replacement | 879 | 99.9 |
| Voluntary | 1.0 | 0.1 |

**TABLE 3: DEMOGRAPHIC PROFILES OF BLOOD DONORS**

| Age (Years) | Total number | Number of males (%) | Number of females (%) |
|---|---|---|---|
| 17 – 26 | 10 | 7 (0.8%) | 3 (0.3%) |
| 27 – 36 | 309 | 286 (32.5%) | 23 (2.6%) |
| 37 – 46 | 486 | 467(53.1% | 19 (2.2%) |
| 47 – 56 | 75 | 73 (8.3%) | 2 (0.2%) |
| **Total** | 880 (100%) | 833 (94.7%) | 47 (5.3%) |

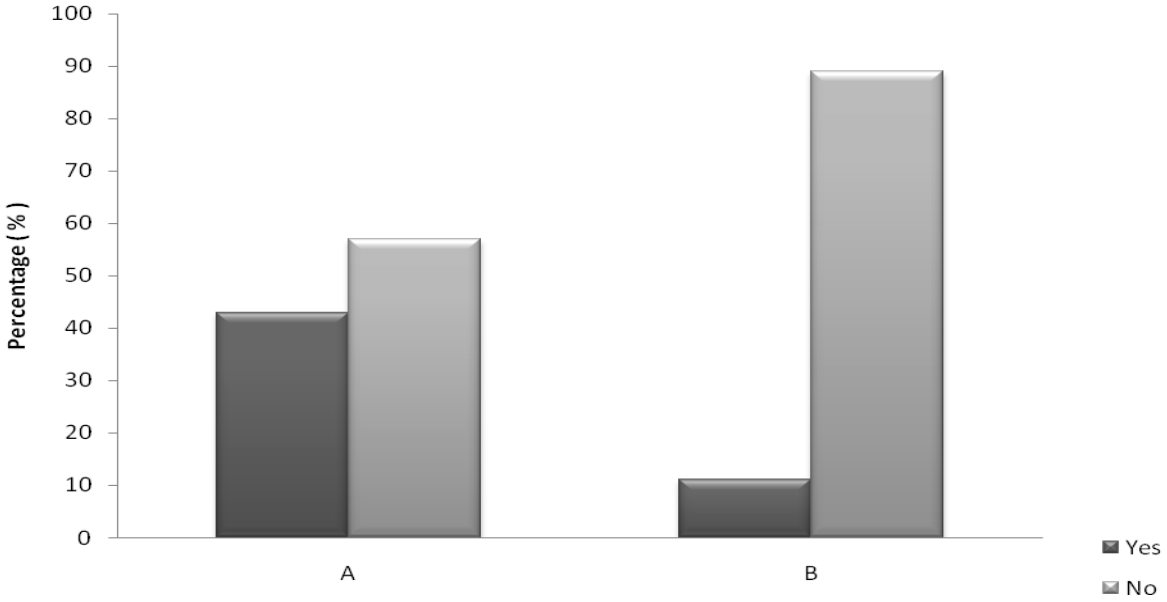


**FIGURE 1: SEXUAL HISTORY OF DONORS**

**Legend:**
A - In the last few months have you had sex with someone you are not sure about?
B – Have you in the last year had sexually transmitted infection?

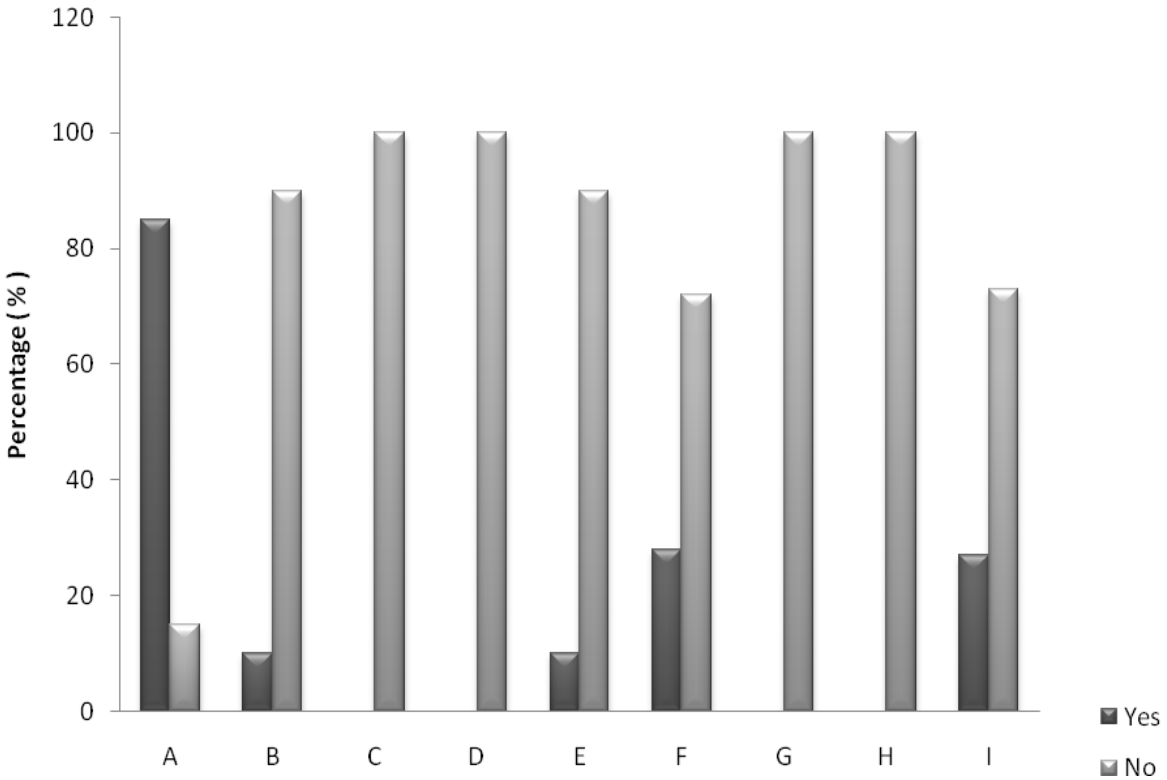


**FIGURE 2: HEALTH STATUS OF PARTICIPANTS**

**Legend**
A – Are you living in good condition?
B – Do you have swollen glands?
C – Do you have shingles?
D – Have you received injection in your skin cut, traditionally?
E – Do you have night sweats?
F – Have you ever had blood transfusion?
G – Have you lost a lot of weight, recently?
H – Do you inject drugs?
I – Do you want to know your HIV status from this study?

## Discussion

HIV has continued to pose a great challenge to transfusion medicine, most especially in Africa due to a high transfusion demand. Since it was discovered that HIV can be transmitted through blood transfusion, it became necessary to test all intending blood donors for HIV infection before they are bled to ensure the safety of all blood products to the recipients. The prevalence of HIV among blood donors in this study was 4 (0.45%). The low level of prevalence could be as a result of the donors' status that was prevalent, that is the family replacement and voluntary donors. Similarly, in a study of 6079 donors Hassan *et al*., 2008 reported an average incidence of 2.8% of HIV among apparently healthy blood donors in Kaduna Northern central Nigeria and is comparatively lower than the incidence 3.8% found by Imoru *et al.*, 2003 in the northern city of Kano, Nigeria. Meanwhile, Ejele *et al.*, 2005 reported 1% prevalence in Port Harcourt in South South of Nigeria. This is slightly higher than our study. Zacharia *et al.*, 2002 reported an HIV incidence of 22% among blood donors in Kampala Uganda in East Africa which is significantly higher than the Nigerian studies. An Indian study on a rural population in 2003 reported a HIV prevalence of 1.56% among blood donors (Sonwane *et al.*, 2003).

The prevalence of HIV infection among blood donors varies from one geographical location to another and can provide a reasonable 'proxy' for HIV infection levels in a larger adult population (WHO/UNAIDS, 2000).

As of January 2004 to December 2008, a total of 15,569 blood donors have been screened for HIV antibodies in Jos University Teaching Hospital of which 1070 were positive, giving a seroprevalence rate of 6.9% (Egesie *et al.*, 2011). In contrary the study by Hassan *et al.* (2008) in Kaduna, North-western Nigeria and the work by Egessie and Egessie, 2011 in Jos University Teaching Hospital had higher prevalence rate of 2.8% and 6.9% respectively. Fasola *et al.* (2009) in Ibadan, South-west Nigeria also reported high prevalence rate.

This prevalence rate obtained in this study is lower than the 0.08% found by Gupta *et al.* (2004) in their study among Indian blood donors. It is also higher than the 0.004% found by Bhatti *et al.* (2007) in Karachi among Pakistani donors, and the 0.00009% found by Khan *et al.* (2002) in Peshawar among Pakistani donors.

The HIV infection rate in this study is also lower than 1.0% in the work of Ejele *et al.* (2005) in Port Harcourt, South-south Nigeria; the 3.1% found by Fiekumo *et al.* (2009) in Osogbo, South-west Nigeria; the 3.9% found by Esumeh *et al.* (2003) in another study in Benin city, South-south Nigeria; the 5.8% in the works of Chikwem *et al.* (1997) in Maiduguri, North-eastern Nigeria and that of Abdalla *et al.* (2005) among Kenyan donors. Furthermore, Fasola *et al.* (2009) found an infection rate of 7.7% among their donors in Ibadan, Southwestern Nigeria while Matee *et al*. (1999) in their work among Tanzanian donors, and Kagu *et al*. (2005) in their work in Nguru, North-eastern Nigeria found an HIV infection rate of 8.7%.

The wide differences in the HIV infection rate among the blood donors in the different regions within Nigeria, and even those outside Nigeria may be due to the differences in geographical locations, age range of donors, sample sizes, the period of time the studies were carried out, and the different socio-cultural practices such as sexual behavior, marriage practices, circumcision, scarification, tattooing e.t.c. which take place in these regions. Access to healthcare services and the laboratory test reagent kits used may also be contributory factors. (Egesie and Egesie, 2011).

In the course of sampling, it was observed that most donors had family members or friends that were admitted in the teaching hospital and needed blood transfusion in other to save their lives. These types of donors are known as family replacement and voluntary blood donor, respectively. Family replacements were about 879 in number (99.9%) and voluntary donors were 1.0 in number (0.1%). According to Schneiber and Busch (1996), commercial remunerated blood donors and family replacement are more likely to transmit transfusion transmissible infections than voluntary donors, due to the fact that commercial remunerated donors often come from the poorest sectors of the economy, may be poor in health and they are more likely to give blood more often than recommended. The safest blood donors are voluntary, unpaid donations (FMOH, 2009). Family replacement and paid donations as largely practiced in Nigeria and it is associated with higher risk of Transfusion Transmissible Infection (FMOH, 2009).

Another possible reason for low level of prevalence could be that the HIV screening could have been done during the window period when the viral load in the blood is very low which will elicit low production of antibodies by the immune system. According to Bush and Alter (1995), tests exist that detect the virus itself rather than antibodies; these are called HIV p24 antigen tests. A test of this kind is sometimes possible to detect HIV antigen during the window period, if by coincidence the blood donor happens to be tested during the short peak of high levels of circulating virus particles (Bush & Alter 1995).

Males were seen to be more involved in blood donation than females in the course of this study; Males were 833 (94.7%) while females were 47 (5.3%). Men tend to be more involved in blood donation than women because they are not associated with the normal monthly flow of blood that occurs among women, so they can at any time donate blood. The percentage in this study is similar to the 95% in the study of Egah *et al.*, 2004. Muktar *et al.*, in 2005 found that 98% of their donors were males while Nwokediuko *et al.*, 2007 in their study in Enugu, South Eastern, Nigeria found that 91.8% of their donors were males.

A higher prevalence of HIV was observed among youths in the age range of 27 - 36 years. Youths of this age are more prone to high risk behaviours, as maintenance of multiple sex partners, intravenous drug use and other risky behaviours that make people vulnerable to this infection (Ejele *et al.*, 2005).

Donors were examined and asked specific questions about their sexual history and health status that might make the donation unsafe for the recipient. A major goal of transfusion medicine practice has been to reduce the risk of transfusion transmitted infection to as low as possible (Aubuchon *et al.*, 1997). In this study, 43% had sex in the last few months with someone they were not sure of. This is a risk factor for recipient. People who are considered vulnerable to HIV infection due to their risky sexual or drug- injecting behaviour are female sex workers (FSWs), men who have sex with men (MSM), Truck drivers, migrant workers and Intravenous drug users (IDU). Other sexually transmitted infection, if not properly treated can easily be transmitted through blood (Ejele *et al*., 2005). Eleven percent in this study had sexually transmitted infection. Potential donors are evaluated for anything that might make their blood unsafe to use (FMOH, 2007).

Eighty-five percent of donor as at when interviewed were living in good condition. Potential donors whose poor health or nutritional status makes them unsuitable should also be excluded, for the sake of their own health as well as the health of the recipients (UNAID, 1997). Swollen gland, night sweat and shingles are some common symptoms in a number of infections and malignant disease. It is a recognised symptom of very many diseases (Mindel and Tenant, 2001). This study observed a low rate of some of these symptoms associated with HIV. The 10 % of swollen glands among blood donors in this study could be an indication of either a bacterial or viral infection. Generalized lymphadenopathy is an early sign of infection with HIV (Mindel and Tenant, 2001). Respondents in this study claim not to have lost weight in the course of the interview. Weight lost is prevalent in HIV patients, usually 2 - 4 weeks of post exposure (Kahn, 1998). Blood donors in this study indicated that they have not received injection or skin cut by traditional healers and injection by drug users. Reasons could be that some respondents were unwilling to reveal these acts. People who receive piercing through unsterilized sharp object can also be at risk of infection (Kaplan and Heimer, 1995).

In this study, 28% had previously received blood. Individuals could be at risk of being infected if blood given to them was not screened properly (Busch, *et al.*, 1996). Individuals in this study who do not wish to be told the result of the HIV test performed on them was 73%. This is high and can be attributed to the level of stigmatization of those living with HIV in Nigeria and elsewhere. The principles of voluntary testing, informed consent, and confidentiality should be respected and post-test counseling provided (UNAIDS, 1997).

## Conclusion

The study showed low prevalence rate of HIV infections among blood donors. So, the rate of transfusion of HIV infected blood is drastically reducing in Port Harcourt. As observed in this study, people donated blood just because their family members were involved in one health condition or the other and needed blood for survival. Therefore, people should be encouraged to donate blood.

## Recommendations

Sensitization about the importance and responsibility of being a blood donor is essential so that prospective donors can make the correct decisions to donate (UNAIDS 1997). Also Campaigns that encourage voluntary non remunerated donors should be intensified using media, opinion leaders, traditional and religious leaders, government officials and organised civil society. The health system in the country should be strengthened to recruit well trained and motivated health care workers, repair and upgrade health facilities as well as repair and replace obsolete equipment. Blood donations in communities with high prevalence of HIV should be discouraged. In addition screening blood with ELISA, antigen and NAT screening should be implemented.

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