OCCUPATIONAL EXPOSURE TO HIV AMONG HEALTHCARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV SITES PORT HARCOURT, RIVERS STATE

BY

AKPUH NDUBUISI
M.B.B,Ch (CALABAR)

MATRIC NO: 180461

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CERTIFICATION

I certify that this project work was carried out by Akpuh Ndubuisi in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan under my supervision.

16/01/2017

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Supervisor
Dr. IkeOluwapo Ajayi, M.B.,B.S, M.CI.Sc, MPH, PhD, Cert, Field Epid, FMCGP, FWACP
Reader, Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Nigeria.

.....

Co-Supervisor
Dr. S.A. Adebowale, B.Sc , P.G.D, M.Sc, M.Sc, Ph.D , RF (South Africa)
Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
College of Medicine,
University of Ibadan,
Nigeria.

DEDICATION

This project is dedicated to God the Father, the Son and the Holy Spirit.

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With abundant sense of indebtedness, I am humbly grateful to God for his mercies and what he has done at his appointed time. He identifies me in the midst of the multitude of life's crowds, He acknowledges and grants my heart desires and to Him alone I look up to for favours.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

Abbreviation		Meaning
AIDS	-	Acquired Immune Deficiency Syndrome
ARD	-	Anti-retroviral Drug
ARV	-	Antiretroviral
BBF	-	Blood and Body Fluid
CDC	-	Centre for Disease Control
CI	-	Confidence Interval
FMoH	-	Federal Ministry of Heath
HCW	-	Health Care Worker
HIV	-	Human Immune Deficiency Syndrome
LGA	-	Local Government Area
NS	-	Needle Stick
NSSIs	-	Needle Stick & Sharps Injuries
PEP	-	Post Exposure Prophylaxis
PLWHA	-	People Living with HIV AIDS
PMTCT	-	Prevention of Maternal to Child Transmission
PH	-	Port Harcourt
PHF	-	Private Health Facility
PPE	-	Personal Protective Equipment
Pr.EP	-	Pre – exposure Prophylaxis
SD	-	Standard Deviation
STI	-	Sexually Transmitted Infections
TB	-	Tuberculosis
USA	-	United States of America
WHO	-	World Health Organization

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ABSTRACT

Exposures to pathogen infecting blood and or body fluids of patient either by accidental needle prick, sharps or splash into mucous membranes are attributable to occupational infections among healthcare workers. Rivers State has the highest HIV prevalent rate in Nigeria. This poses a high risk of occupational exposure and transmission to healthcare workers. This study was carried out to determine prevalence and the factors associated with occupational exposures to HIV among healthcare workers in private and public Prevention of Mother to Child Transmission of HIV (PMTCT) sites within Port Harcourt.

A descriptive cross-sectional study was conducted from identified PMTCT sites using multi stage sampling technique. In stage one 44 PMTCT sites was selected from 56 sampled by simple random sampling, in stage two the sample size of 337 was allocated equally among 44 facilities which yielded 6 participants per facility, while in stage three one participant was drawn from each professional cadre, then two participants was drawn randomly among doctors, nurses, laboratory scientist and environmental healthcare workers which were professional cadre of interest. Data was collected using interviewer administered questionnaire after obtaining informed consent. Socio-demographics of healthcare workers, organizational and behavioral related variables were assessed relative to occupational exposures. Data were analyzed using descriptive statistics, Chi-square and logistic regression models ($\alpha = 0.05$).

Mean age of the respondents was 35.9 SD ± 8.4 years and 67 (19.9%) were males and 270 (80.1) were females. Participants from the public health facilities were 171(50.7) while 166(49.3) participants were drawn from the private facility. In the prevalence of 45.0% (n = 337), needle stick prick accounted for 32.6% (n=153) while contact with potentially infectious body fluid was 33.3%. Sixty three point three percent (63.3%) experienced exposure more than once. Safety information for safety precautions was at the disposal of 56.1% of participants. Reporting system was not in existence in some facilities as reported by 38.9% of study participants. Majority (98%) of participants required training on infection prevention while 16% of sampled PMTCT sites do not practice waste separation. Poor

supply of PPE was reported by 32.8% of participants. Doctors have 46.1% less likelihood of experiencing occupational exposure than nurses. The odds of occupational exposure among doctors were two times higher than other healthcare workers [AOR=0.4; C.I = 0.195 – 0.929], environmental health workers has about 42 times more likelihood of experiencing occupational exposures than nurses [AOR = 11.2; C.I =2.190 - 56.777]. while laboratory scientists are about 1.2 times more likely to experience occupational exposure than nurses [AOR=1.04;C.I=0.525-2.078]. Working more than 40 hours per week was associated with higher risk of occupational exposure [AOR=0.30; C.I = 0.301 – 0.919].

Occupational exposure to HIV infection is prevalent among healthcare workers in PMTCT sites in Port Harcourt. Extended working hours and inadequate PPE supplies increases the risk of occupational exposure. Adherence to universal precautions, proper handling of occupational exposure related cases, adequate medical waste disposal and regular training/retraining of health care workers should be encouraged.

Key Words: Occupational exposure, Healthcare workers, PMTCT facilities, Port Harcourt Nigeria.

Word count: 499

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CHAPTER ONE

INTRODUCTION

1.1 Background

HIV/AIDS is one of the infectious diseases that threaten human existence in the last three decades. The severity of the effect of the disease on the individual, family and national level is enormous particularly in developing countries like Nigeria. Nigeria accounts for 10 % of the global burden of the disease and the national prevalence rate is 4.1% (UNAIDS, 2016). Nigeria is the most populous black nation in the world with population of 160 million. Nigeria has the 2nd largest number of people living with HIV/AIDS (PLWHA) (3.1million) in African continent after South Africa which has (5.6) million people infected. According to National AIDS Reproductive Health survey 2013, variation existed in HIV prevalence and pattern across the states in Nigeria. Rivers State has a prevalence of 15.2% which is the highest in the country compared to other states including the Federal Capital Territory Abuja. People living with HIV/ AIDs are also frequently co-infected with other diseases such as tuberculosis, sexually transmitted infections, hepatitis, malaria among others which complicate diagnostic and treatment interventions.

HIV/AIDS has many transmission routes with the most common being sexual intercourse. The other routes of transmission include mother to child transmission, exposure to blood and blood products or contaminated body fluids. Health workers are constantly exposed to occupational infection as a result of their day to day routine of taking care of patients where body fluids are encountered during different medical intervention in the health care setting. Blood–borne pathogen transmission occurs predominantly by percutaneous or mucosal exposure of workers to blood and body fluids of infected persons. Occupational exposures associated with the risk of HIV transmission include needle stick and other sharp injuries; direct inoculation of virus into cutaneous scratches, skin lesion, abrasions, or burns and

inoculation of virus onto mucosal surfaces of the eyes, nose or mouth through accidental splashes (Alemie, 2012). HIV is not known to penetrate intact skin spontaneously and air bone transmission of the virus has never been documented (Amoran, 2013).

Studies have demonstrated low rates of HIV sero-positivity among health care workers with non-occupational risk. Percutaneous exposure to blood and body fluids through contaminated needle stick and sharps are an important occupation hazard for morbidity and mortality from infections with blood borne pathogens among healthcare workers (Odongkara et.al.,2012). High HIV sero-positivity amongst healthcare workers with occupational risk compared to healthcare workers with non-occupational risks is a general experience as the risks of occupational transmission vary with the type of exposure and severity of exposure as well as place of work such as the PMTCT site. PMTCT sites are specialized sites for pregnant HIV mothers where efforts are made to prevent mother to child transmission of HIV virus. Healthcare workers at the PMTCT sites are known to be more exposed than other health care workers in other health facilities. This is because the PMTCT sites are designated sites for HIV patients and the care they receive during labour and child delivery reveals their body fluids and these fluids contain HIV virus that could infect a health worker. Healthcare workers within the facility who are at greater risk of acquiring the HIV infection include doctors, midwives, laboratory personnel and environmental health workers. Healthcare personnel are not only more likely to become infected by their patients but may be source of infection to patients and fellow employees if infected with the virus (Ciesielski et.al., 1991). Many healthcare workers are at an increased risk of percutaneous exposure and accidental needle stick injuries because of their work environment, poor knowledge and use of personal protective equipment. As a result these workers are at risk of occupational acquisition of blood borne pathogen such as HIV.

Occupational exposures are hardly reported and are common occurrences in resource poor country like Nigeria. Adherence to occupational health guidelines is difficult in the Nigerian private and public sector due to lack of proper protective device and inadequate disposal of infected fluids, wastes and sharps. Additionally, under staffing leading to a high turnover of

short–term staff with poor knowledge of guidelines and polices is one of the challenges regarding the susceptibility of healthcare workers to HIV/AIDS.

In order to develop effective policy measure at reducing the risk of occupational exposure to HIV infections among healthcare workers. It is essential to understand reasons for their exposure in a specialized high risk clinical setting (Yimechew et. al., 2013;Tesfay and Habtewold, 2014).

1.2 Problem Statement

With global emphasis on achieving universal access to treatment as strategy for addressing HIV and AIDS without addressing the chronic health worker to patient ratio of 1 health worker per 1000 population (WHO, 2006). This has implied the problem of increase turnover of patients seeking care as is the case at the HIV specialized facilities such as PMTCT site that have become stretched in manpower and medical supplies for HCW protection. In the phase of high HIV prevalence of 15.2 in Rivers State; increasing number of patients seeking medical care with the problem of shortage of corresponding healthcare work force and shortage of protective equipment needed to protect healthcare workers while attending to patient as seen in developing countries (Gebresilassie et al., 2014) . Healthcare workers are at increased risk of occupational exposure than ever before. This has compounded by the recent economic challenges in the country. There is donor's apathy in support to health care services where they provide most of what is required materially for HIV services.

Visiting most of the active sites one easily observes the frustration of health care workers in trying to meet with the expectation of attending to overwhelming patients population with limited protective materials to work with. This is not supposed to be. Healthcare workers in general sense are supposed to have maximum protection from occupational exposures to infection and more in HIV specialized healthcare settings. If definition of health by WHO is anything to go by as a state of complete physical and emotional wellbeing and not merely the absence of disease and infirmity, then healthcare workers in these sites cannot be said to be healthy and or attending to patients in a healthy state of mind. This is because working

situation at present in HIV care facilities is capable of and is indeed destroying the moral of healthcare workers (Mashoto et. al., 2013).

The situation in HIV specialized centers is that health care workers who do not abandon their job for greener pastures and better working conditions in foreign countries are at increased risk of contracting HIV infection (Gebresilassie et. al., 2014). In either ways of the divide, it would impact on the health system that is under strain of understaffing and underfunding and in the end, healthcare workers will be lost faster than they can be replaced either by succumbing to the AIDS pandemic or by continuing migration. This problem is influenced by the chronic neglect of health sector over the years and has become worse by the present economic challenges facing the country where government is struggling to pay worker's salaries and would therefore consider health system financing a secondary priority in her financial engineering.

Donors and partners that have substantially supported and sustained financing of health programmes are winding down and insisting that it is high time government took over from them. In the past, government has set up agencies and control programmes to contain infection and the present committee on infection prevention. However, these programmes have suffered the common problem of underfunding and have not made expected impacts (Yimechew et. al., 2013). At present there is no information to the prevalence of occupational exposure to HIV infection among healthcare workers which should be surveillance system based. The issues of occupational exposure to HIV infection among health workers cannot be overlooked.

Centre for Disease Control and Prevention published that as at 31st December, 2013 there were 58 confirmed occupational transmissions in USA. Healthcare workers exposed to needle stick involving HIV-infected blood at work have 0.23% risk of becoming infected. In other words, 2 to 3 of every 1000 of exposure result in infection (CDC, 2016). This is expected even worst in developing countries where for many years healthcare workers have become infected with HIV as a result of their work. Although, this accounts for a smaller proportion of the infection cases but significant. Therefore, this study will determine the magnitude of occupational exposure among healthcare workers and associated factors in

relation to the occupational hazards to human immunodeficiency virus infection. The information from this study and the recommendation would strengthen infection prevention activities and practices and by so restore healthcare workers moral in service delivery and stern health workers attrition.

1.3 Justification

Acquired human immune deficiency syndrome is disease of the human immune system caused by infection with human immuno-deficiency virus. Worldwide, HIV/AIDS has created enormous challenges on the survival of mankind. Nigeria is no doubt among sub-Saharan African countries hard-hit by HIV/AIDS. According to National Reproductive and Aids Survey 2013 (The Federal Ministry of Health and Partners) HIV prevalence in Rivers State is at 15.4%, the highest in the country. Healthcare workers are facing a number of unique challenges to stay healthy in the face of generalized HIV/AIDS epidemics. Despite all the interventions, the rate of transmission is still in the increase, translating to an increase in the number of HIV patients in need of health care services under a stretched health care work force coupled with poor supplies of medical protective equipment in our health institutions. Consequently, health workers are at increased risk of exposure. With a high prevalence of 15.4% in Rivers State (Federal Ministry of Health, 2012), there is the need to consider patient to health worker transmission and health-worker to patient transmission. It is important to establish the prevalence and determine factors associated with occupational exposure.

Even though human immunodeficiency virus infection is an epidemic condition all over the world for decades and has attracted studies that yielded considerable insight to the control and management of HIV infection, not much has been done on occupational exposure and acquisition to health workers infection (Mashoto et. al., 2013). This study focuses on healthcare workers who are more vulnerable to human immunodeficiency virus exposure due to their occupation. Furthermore, some studies are centered on healthcare workers in the general healthcare setting. There are no significant studies to consider special group of

health care workers whose day to day duty is directed at HIV infected patients and or whose vulnerability is higher with respect to occupational exposure (Alemie, 2012).

More so, there is limited study involving environmental health workers or hygienist as they are in certain preference referred to. These are a group of health workers whose trade do not require formal education where infection prevention is thought and therefore do not know the implications of occupational exposure and the need to guard against occupational risk by adhering strictly to safety rules and standard precaution procedures. Majority of the hygienist group of health workers are not educated and can as such not read and understand safety protocols. This study includes this group of health workers in the evaluation of their occupational exposure to HIV infection. Additionally, much is not known on the occupational status of health care workers in private health facilities where the intent of proprietors is more on profit maximization than the additional cost to provide training on infection prevention and safety equipment to health workers (Mashoto et. al., 2013). The inclusion of private facilities in this study will reveal the extent of hazard to health care workers in the private health care settings and provide data guided intervention in this regard.

Although the occupational risk of health workers acquisition of HIV is considered to be small (Kumakech et. al., 2011); it is also known that the occupational risk of HIV infection among health workers depends on factors such as the prevalence of such infection among patients (Beyera & Beyen 2014). The incidence of event in which health workers are exposed to HIV-infected fluids; and the chance of transmission following occupational exposure to HIV are established factors (Kumakech et. al., 2011). Rivers State is the highest in prevalence of HIV among other states in the federation and the Federal capital territory Abuja. Despite the attention given in the control of other established modes of transmission, there is the need for critical evaluation of other means of transmissions such as occupational exposures and transmission. Also with the high prevalence, there is the need for a greater health workers safety concern and protection in the phase of considerably increased number of HIV patients with increased activity for many healthcare workers providing medical care to HIV Seropositive patients in Rivers State.

The nature (including the source of infection) and the actual magnitude of the exposed HCWs, including the prevalence of exposure events and number of HCW exposed are inadequately reported from most sub-Saharan African countries such as Nigeria (Mashoto et. al., 2015). In Rivers State, inadequate data exist about occupational exposure in relation to transmission of blood-borne pathogens among healthcare providers and this is partly due to lack of systematic studies. Therefore this study will be carried out as part of proper documentation on a comprehensive assessment of the prevalence and determinant of occupational exposure to HIV among healthcare workers in the state and abridge the paucity of research information concerning occupational exposure. It will also provide inference regarding the effectiveness of the strategies used to control HIV associated with occupational exposure. It will also provide information on the safety of health workers regarding their exposure to HIV infection and there observance of standard precaution procedures. This research will guide health workers and government agencies in their evaluation of the work safety protocol. Furthermore, it will add to the few existing baseline information on HIV/AIDS exposure among health care workers in PMTCT facilities in Rivers State. This study further opens the frontier for a healthier future of health care workers and who have justified concern about the risk of occupational exposure.

1.4 Research Question

This study hopes to find answers to the following research questions:

1.4.1 What is the prevalence of occupational exposure to HIV infection among healthcare workers in specialized HIV care facilities within Port Harcourt metropolis?

1.4.2 Are healthcare workers adhering to Standard Precaution Procedures and use of personal protective equipment?

1.4.3 What is perception of healthcare workers to being at risk of HIV infection?

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1.4.2 Are healthcare workers adhering to Standard Precaution Procedures and use of personal protective equipment?

1.4.3 What is perception of healthcare workers to being at risk of HIV infection?

1.4.4 How readily available are safety protocol/regulation or standards on HIV prevention in PMTCT sites?

1.4.5 What are the factors associated with the risk of occupational exposure to Human Immunodeficiency Virus infection among healthcare workers in PMTCT sites within Port Harcourt metropolis of Rivers State?

1.5 Aim and Objectives

1.5.1 General Objective

To determine the prevalence and determinants of occupational exposure to human immunodeficiency virus infection among healthcare workers in PMTCT sites within Port Harcourt metropolis.

1.5.2 Specific Objectives

1. To determine the prevalence of occupational exposure to Human Immunodeficiency Virus infection among healthcare workers in PMTCT sites.
2. To assess risk perception to occupational exposure to HIV infection among healthcare workers in PMTCT sites
3. To assess practice of standard precaution procedure and use of personal protective equipment by healthcare workers in PMCT sites.
4. To identify factors associated with the risk of occupational exposure to human Immunodeficiency virus infection among healthcare workers in PMTCT sites.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAME WORK

2.1 HIV Infection Overview

From the WHO fact sheet updated July 2016, HIV is said to have claimed more than 35 million lives the world over. It states that in 2015, 1.1 (940 000 – 1.3 million) million people died from HIV-related causes globally. The most affected region of the world in HIV pandemic is the Sub-Saharan Africa, with 25.6(23.1-28.5) million people living with HIV in 2015. Also Sub-Saharan Africa accounts for two-thirds of the global total 2.1(1.8-2.4) of new HIV infections in 2015. In sub-Saharan Africa, Nigeria has the second highest burden of HIV behind South Africa. Rivers State, where study was conducted has the highest prevalence of HIV in Nigeria. Nigeria has a generalized epidemic with a prevalence 3.4%(Federal Ministry of Health,2012) an estimated 3.2 million people living with HIV. 2.2 million AIDS related deaths annually and 2,229,883 total AIDS orphans . With respect to age distribution, HIV prevalence was highest among the 35-39 years age group (4.4%) and lowest among the 15-19 years age group (2.9) while widowed had the highest prevalence (6.2%).

HIV pandemic has continued to threaten the existence of mankind as there is no cure to HIV infection and the disease is not vaccine preventable. However, it is documented that effective antiretroviral (ARV) drugs can control the virus and help prevent transmission so that people with HIV ,and those at substantial risk, can have a better and productive lives but then the average cost of a month regimen of this anti-retroviral drug is expensive for most developing countries that depend on donor agencies . Hence the implication is that often time it is not every person affected that will have access to the drug and maintain treatment for life as required. Economically challenged economies of Africa find it difficult to meet with the cost implications of providing ARD for all diagnosed HIV patients where hunger and poverty is also ravaging the citizens.

2.1.1 Pathology of HIV Infection

The Human Immunodeficiency Virus (HIV) targets the immune system upon exposure to the HIV virus where infection is established and weakens the defense systems against infections and some types of cancer. As the virus destroys and impairs the function of immune cells, an infected individual gradually become immune-deficient as the HIV virus preferentially targets the CD4 cells. Immune function is typically measured by CD4 cell count. Immunodeficiency results in increased susceptibility to a wide range of infections and diseases that people with healthy immune systems can fight and wall off. The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS), which can take from 2 to 15 years to develop which is individual specific. AIDS is defined by the development of certain cancers, infections, or other severe clinical manifestations.

2.1.2 Clinical Features of HIV Infection

The symptoms of HIV vary depending on the stage of infection. Though people living with HIV tend to be most infectious in the first few months, many are unaware of their status until later stages. The first few weeks after initial infection, individuals may experience no symptoms or an influenza-like illness including fever, headache, rash or sore throat. As the infection progressively weakens the immune system, an individual can develop other signs and symptoms, such as swollen lymph nodes, weight loss, fever, diarrhoea and cough. Without treatment, they could also develop severe illnesses such as tuberculosis. cryptococcal meningitis, and cancers such as lymphomas and Kaposi's sarcoma. among others.

2.1.3 Transmission of HIV virus

HIV can be transmitted via the exchange of a variety of body fluids from infected individuals, such as blood, breast milk, semen and vaginal secretions. Individuals cannot become infected through ordinary day-to-day contact such as kissing, hugging, shaking hands, or sharing personal objects, food or water.

2.1.4 Diagnosis

HIV infection is often diagnosed through rapid diagnostic tests (RDTs), which detect the presence or absence of HIV antibodies. Most often these tests provide same day test results; essential for same day diagnosis and early treatment and care. Serological tests, such as RDTs or enzyme immunoassays (EIAs), detect the presence or absence of antibodies to HIV-1/2 and/or HIV p24 antigen. When such tests are used within a testing strategy according to a validated testing algorithm, HIV infection can be detected with great accuracy. It is important to note that serological tests detect antibodies produced by an individual as part of their immune system to fight off foreign pathogens, rather than direct detection of HIV itself.

Most individuals develop antibodies to HIV-1/2 within 28 days and therefore antibodies may not be detectable early after infection, the so-called window period. This early period of infection represents the time of greatest infectivity; however HIV transmission can occur during all stages of the infection. It is best practice to also retest all people initially diagnosed as HIV-positive before they enroll in care and/or treatment to rule out any potential testing or reporting error.

2.1.5 Treatment

HIV can be suppressed by combination ART consisting of 3 or more ARV drugs. ART does not cure HIV infection but controls viral replication within a person's body and allows an individual's immune system to strengthen and regain the capacity to fight off infections. In 2015, WHO released a new "Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. The guidelines recommend that anyone infected with HIV should begin antiretroviral treatment as soon after diagnosis as possible. By the end of 2015, 17.0 million people living with HIV were receiving ART globally which meant a global coverage of 46% (43–50%). Based on WHO's new recommendations, to treat all people living with HIV and offer anti-retroviral as an additional prevention choice for people at "substantial" risk, the number of people eligible for antiretroviral treatment increases from 28 million to all 36.7 million people. Expanding access to treatment is at the heart of a new set of targets for 2020 which aim to end the AIDS epidemic by 2030.

2.1.6 Risk factors

Behaviors and conditions that put individuals at greater risk of contracting HIV include: Having unprotected anal or vaginal sex; Having another sexually transmitted infection such as syphilis, herpes, chlamydia, gonorrhoea, and bacterial vaginosis; Sharing contaminated needles, syringes and other injecting equipment and drug solutions when injecting drugs; Receiving unsafe injections, blood transfusions, medical procedures that involve unsterile cutting or piercing; and Experiencing accidental needle stick injuries, including among health workers which are the bane of this study.

2.1.7 Prevention

Individuals can reduce the risk of HIV infection by limiting exposure to risk factors. Key approaches for HIV prevention, which are often used in combination, include:

1. Male and Female Condom Use

Correct and consistent use of male and female condoms during vaginal or anal penetration can protect against the spread of sexually transmitted infections, including HIV. Evidence shows that male latex condoms have an 85% or greater protective effect against HIV and other sexually transmitted infections (STIs).

2. Testing and counselling for HIV and STIs

Testing for HIV and other STIs is strongly advised for people that are exposed to any of the risk factors. This way people learn of their own infection status and access necessary prevention and treatment services without delay. WHO also recommends offering medical test for partners/couples. Tuberculosis (TB) is the most common illness among people with HIV. It is the cause of death among people with HIV- responsible for 1 of every 3 HIV-associated deaths. Early detection of TB and prompt linkage to TB treatment and ART can prevent these deaths. It is strongly advised that HIV testing services integrate screening for TB and that individuals diagnosed with HIV and active TB urgently use ART.

3. Voluntary Medical Male Circumcision

Medical male circumcision, when safely provided by well-trained health professionals, reduces the risk of heterosexually acquired HIV infection in men by approximately 60%. This is key intervention in generalized epidemic settings with high HIV prevalence and low male circumcision rates.

4. Harm Reduction for Injecting Drug Users

People who inject drugs can take precautions against becoming infected with HIV by using sterile injecting equipment, including needles and syringes, for each injection. A comprehensive package of interventions for HIV prevention and treatment includes: Needle and syringe programmes, Opioid substitution therapy for people dependent on opioids and other evidence based drug dependence treatment, HIV testing and counselling, HIV treatment and care, Access to condoms, and Management of STIs, tuberculosis and viral hepatitis.

5. Elimination of Mother-to-Child Transmission of HIV (EMTCT)

The transmission of HIV from an HIV-positive mother to her child during pregnancy, labour, delivery or breastfeeding is called vertical or mother-to-child transmission (MTCT). In the absence of any interventions during these stages, rates of HIV transmission from mother-to-child can be between 15-45%. MTCT can be nearly fully prevented if both the mother and the child are provided with ARV drugs throughout the stages when infection could occur.

WHO recommends options for prevention of MTCT (PMTCT), which includes providing ARVs to mothers and infants during pregnancy, labour and the post-natal period, and offering life-long treatment to HIV-positive pregnant women regardless of their CD4 count. In 2015, 77% (69–86%) of the estimated 1.4 (1.3-1.6) million pregnant women living with HIV globally received effective antiretroviral drugs to avoid transmission to their

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6.0 Antiretroviral (ART) Use for Prevention

6.1 ART As Prevention

A 2011 trial has confirmed if an HIV-positive person adheres to an effective ART regimen, the risk of transmitting the virus to their uninfected sexual partner can be reduced by 96%. The WHO recommendation to initiate ART in all people living with HIV will contribute significantly to reducing HIV transmission.

6.2 Pre-exposure Prophylaxis (PrEP) for HIV-Negative Partner

Oral PrEP of HIV is the daily use of ARV drugs by HIV-uninfected people to block the acquisition of HIV. More than 10 randomized controlled studies have demonstrated the effectiveness of PrEP in reducing HIV transmission among a range of populations including sero-discordant heterosexual couples (where one partner is infected and the other is not), men who have sex with men, transgender women, high-risk heterosexual couples, and people who inject drugs.

In September 2015, WHO published the "Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV", that recommends PrEP as a prevention choice for people at substantial risk of HIV infection as part of combination prevention approaches.

6.3 Post-exposure prophylaxis for HIV (PEP)

Post-exposure prophylaxis (PEP) is the use of ARV drugs within 72 hours of exposure to HIV in order to prevent infection. PEP includes counselling, first aid care, HIV testing, and administering of a 28-day course of ARV drugs with follow-up care. The updated WHO guidelines issued in December 2014 recommend PEP use for both occupational and non-occupational exposures and for adults and children. The new recommendations provide simpler regimens using ARVs already being used in treatment. The implementation of the new guidelines will enable better prescribing, better adherence and increased completion rates of PEP to prevent HIV in people who have been accidentally exposed to HIV such as health workers or through unprotected sexual exposures or sexual assault.

2.2 Occupational Exposure

Exposure to body fluids containing pathogen has a potential risk of transmission of blood-borne pathogens that can cause disease such as human immunodeficiency virus and hepatitis to healthcare workers. Health care workers are at risk of infection with blood borne pathogens because of occupational exposure to potentially infected blood and body fluids. Over 90% of these infections are occurring in low-income countries and most are preventable (Sangwan et. al. 2011). Exposure to HIV virus in the health care setting is mainly caused by contaminated sharp objects, such as syringe needles, scalpels and broken glass. Three infections most commonly transmitted to healthcare workers are hepatitis B virus (HBV), hepatitis C (HBV) and human immunodeficiency virus (HIV). Occupational acquisition of HIV infection results from percutaneous, mucous membrane or non-intact skin exposure to blood, body fluid, sharps, or needles that occur during the course of an individual work. From research findings the estimated risk of HIV/AIDS transmission after injury through needle contamination with human immunodeficiency virus and after mucosa membrane exposure is 0.3% and 0.1%, respectively. While less than 10% of the HIV among health workers is the result of an exposure at work, needle stick injuries accounts for the cause of 95% of the HIV occupational seroconversions which fortunately are preventable with practical low-cost measures and have the co-benefit of preventing exposure to other blood borne viruses and bacteria (Odongkara et. al., 2012; Rapparini, 2006). There has been reported and documented transmission of more than 30 different pathogens by needle stick and sharps (Rapparini, 2006)

The risk of occupational exposure to HIV is most closely related to the activities and duties of the healthcare worker, but the geographical location and practice setting can also affect the risk of exposure and the quality of post exposure care. Healthcare workers practicing in developing countries like Nigeria are more exposed to human immunodeficiency virus following occupational exposure (Amoran, 2013). Less stringent safety regulations or standards, unfamiliar practice conditions and equipment, limited availability of personal protective equipment or safety-engineered devices, increased prevalence of injection therapy and unsafe infection practices, challenging practice conditions that might result in barriers to standard precaution adherence (such as natural disasters or conflict zones), performing

unfamiliar medical procedures and high prevalence of HIV infections (diagnosed and undiagnosed) are factors that increase the risk of HIV infection due to occupational exposure in developing countries. Others are limited access to HIV treatment, resulting in high viral titers in source patients and limited resources for post exposure evaluation and treatment. Interestingly, situations that put the healthcare worker at risk for HIV exposure can also expose the person to hepatitis B, hepatitis C, and other blood borne pathogens that are endemic. Protecting the occupational health of health workers is critical to having an adequate workforce of trained and healthy health personnel.

2.2.1 Healthcare Worker Protection

The 2006 World Health Report entitled Working Together for Health on Human Resources reported on a global shortage of health personnel which it said had reached crisis level in 57 countries and called for the support and protection of the health workforce most of them in Africa and Asia. Despite the importance of health care workers as crucial resource in health care system of developing nations, in many of these countries including those in sub-Saharan Africa, workers are at high risk of preventable life threatening occupational infections. Yet the protection of health care workers in these countries is largely neglected in national priorities for health care and by the international organization that fund health care initiatives.

Health-care workers (HCWs) need protection from these workplace hazards just as much as mining or construction workers. Yet, because their jobs are to care for the sick and injured. HCWs are often viewed as "immune" to injury or illness. Their patients come first. They are often expected to sacrifice their own well-being for the sake of their patients. Indeed protecting health-care workers has the added benefit to contributing to quality patient care and health system strengthening. Some of the same measures to protect patients from infections such as adequate staffing protect health-care workers from injury (World Health Organization, 2006).

Unsafe working conditions contribute to health worker attrition in many countries due to work-related illness and injury and the fear of health workers of occupational infection. including HIV and Tuberculosis. The WHO Global Plan of Action on workers' health calls

on all member states to develop national programmes for health worker occupational health and for WHO to develop national campaigns for immunizing health workers against hepatitis B. Among health workers infected with hepatitis B, the WHO global burden of disease from sharps injuries to health-care workers showed that 37% of the hepatitis B among health workers was the result of occupational exposure. Infection with the hepatitis B virus is 95% preventable with immunization but less than 20% of health worker in some regions of the world have received all three doses needed for immunity. Most of these infections occurring in low income countries which are largely preventable by ensuring and putting in place adequate measures are under reported because of absence or ineffective occupational exposure surveillance, reporting systems and management (Tesfay and Habtewold, 2014).

2.2.2 Occupational exposure surveillance

Since the first case of documented seroconversion after an occupational exposure to human immunodeficiency virus occurred in 1983, most national and regional or regional surveillance systems of occupationally acquired HIV infection have been developed and the risk of occupational exposure to HIV has well characterized in the developed world (Rapparini, 2006) but limited information is available about this transmission risk in resource constrained settings of sub Saharan Africa facing the largest burden of HIV infection. In addition, the feasibility of utilization of Post Exposure Prophylaxis Programs in these settings is largely unclear (Gupta et. al., 2008). It was also pointed out that, despite the high prevalence of blood- borne pathogens in many developing countries, documentation of infection caused by occupational exposure is inadequate resulting from inadequate surveillance structure for occupational exposures. The factors that are attributable to this are categorized as socio-demographic, work environment or organizational factors, and behavioral factors (Beyene and Tadesse, 1996). Even though the degree of exposure varies from time to time or from health institution to health institution, healthcare workers occupational exposure to human immunodeficiency virus infection is prevalent (Ogoina et. al., 2014).

2.3 Prevalence of Occupational Exposure

Despite all known precautionary measures, percutaneous occupational exposure still occurs and is under reported. A report published by World Health Organization estimated that 0.5% of healthcare workers were exposed to human immunodeficiency virus annually, corresponding to an expected 1000 new human immunodeficiency virus infection from occupational exposure. Unconducive working environment pose a high risk of occupational exposure to HIV and transmission to healthcare workers in healthcare facilities attending to HIV patients. About 40% of HBV and HCV infections and 2.5% of HIV infections in healthcare workers are attributable to occupational sharps exposures. There is global variation among the regions of the world in the prevalence of occupational exposure of healthcare workers to blood borne pathogens and more than 90% of these infections occur in developing countries (Reda et. al., 2010). The world over, 4.4% (0.8%–18.5%) of human immunodeficiency virus infection among healthcare workers could be attributed to occupational injuries.

A global estimate of occupational exposure of human immunodeficiency virus cases among healthcare workers is put at 2.5%. Each year, about 1000 human immunodeficiency virus infection occurs among healthcare workers directly as consequence of occupational exposure. According to World Health Organization estimation, 3 million percutaneous exposures occur annually. Among which 35 million healthcare workers globally, over 90% occurring in resource constricted countries (Gupta et. al. 2008). Occupational exposure to blood and body fluids among healthcare professional consist a major occupational hazard globally. The CDC estimates that each year, 385,000 needle stick and other sharp related injuries are sustained by hospital healthcare personnel.

Nurses emerge as the staff group reporting the highest proportion of such injuries. A research done on occupational risk of human immunodeficiency virus infection among western healthcare professional posted in AIDS endemic areas showed that out of 99 Dutch medics working 65% reported percutaneous exposure during an average stay of 21 months. The mean number of injuries was lower among physicians (2.0 versus 3.9 per

year) and higher among nurses (Sangwan et. al., 2011). The risk of HIV transmission from patient to healthcare worker has been shown to be between 0.3% and 0.9% following percutaneous and muco-cutaneous exposure respectively (Sangwan et. al., 2011; Martins et. al., 2012).

In Portugal where HIV prevalence is high, studies shows that among 363 subjects recruited for study, 64.5% reported needle stick and sharps injuries in the previous 5yrs and of the total injuries reported, the commonest were from syringe needle unit of the injured workers,74.8% were nurses (Martins et. al., 2012). In survey conducted among emergency medical residents in United States of America 56.1% reported at least one exposure to blood during their training. The frequency of self-reported exposure increased with advancing level of training. They were frequently exposed to blood; most commonly due to puncture of sharp objects but rate of exposure reporting was low, which may compromise appropriate post exposure counseling and prophylaxis (Sangwan et. al., 2011).

Another study done to know the risk of healthcare workers in developing countries found that healthcare workers in developing countries are at the serious risk of infection from blood-borne pathogens particularly human immunodeficiency virus, hepatitis B virus and hepatitis C virus because of the high prevalence of such pathogens in many regions of the continent (Miceli et. al., 2005) .

In India where occupational exposure to blood and body fluids was accessed among health care workers in a teaching hospital of Armed Forces with the notion that situation has always been better with the military formation giving their high level of discipline and commitment to duty than the public health facilities in India, it was observed that the proportion of HCWs experiencing exposure to blood body fluid splash and needle stick injury during the last one week in a sample size of 70 participants was 47.1% and 31.43%, respectively. Healthcare workers was found not to be using PPE despite its availability and different reasons ranged from busy schedule, none use by coworker, emergencies, risk that patient may get offended by PPE use to discomfort while using PPE. It concluded that the high level of occupational exposure and consequent risk of

infection to Health care workers highlights the urgent need for intervention to enhance the occupational safety of workers (Sangwan et. al. 2011).

In the study conducted in Ethiopia, in Tigray region showed that, out of the total 618 healthcare workers interviewed about occupational exposure in the past three months. 106 (17.2%) had experienced needle stick injury, 348 (56.3%) had contact of blood and body fluid with their skin, and 154 (24.9%) reported exposure to their mucosa membrane. Working in the delivery room (80.4%) and gynecological wards (75%) had higher risk of exposure (Sangwan et al., 2011).

In another study that accessed occupational exposure in northern Nigeria among health care workers, 5.2% of 421 interviewed reported exposures to HIV infected blood or body fluid in their work place in the last six months. It concluded that health care workers that are young ,working in public facilities and have insufficient knowledge about HIV/AIDS have a high risk perception for HIV/AIDS while those in urban and public facilities reported access to prophylaxis medication (Amoran, 2013).

An evaluation of prevalence of occupational exposure to blood /body fluids in two tertiary hospitals in North-central and South-south Nigeria suggest high rates of occupational exposure among health workers. Out of 290 health workers studied, 75.8%, 44.7%, 32.9% and 84.4% had skin contact with patients' blood, needle stick injuries, cut by sharps, blood/body fluid splashes to mucous membrane and one or more type of exposures respectively. It also noted that by professional groups, doctors and nurses had higher and more frequent occupational exposures than other professional groups (Ogoina et. al., 2014).

2.4 Risk Perception, Safety Practices and Supply Personal Protective Equipment

Safety importance is as old as medical practice and has become emphasized in view of the rising awareness in the associated risks involved such as transmission of HIV and hepatotrophic viruses. Yet, healthcare workers especially in the developing countries

exhibit various degrees of risk perception to occupational acquisition of blood borne pathogen from their daily routine.

A study in China that looked at the perceived occupational exposure risk observed that study participants had different levels of perception on the risk of occupational exposure at work. Approximately, half (52%) of healthcare providers thought the risk was high. Three doctors mentioned that no matter how hard they tried to protect themselves, the occupational exposure accident was sometimes unavoidable. As the HIV epidemic continues to grow, their risk becomes higher. However, some other healthcare providers thought that their probability of exposure to HIV at work is low. Fifteen (15%) of health care providers believed that if they carefully followed the self-protection procedures. the exposure risk could be minimized (Lee et. al., 2014).

Study done in South Africa about the knowledge of physicians on occupational risk of human immunodeficiency virus infection dedicated that 83.3% of the respondents did not appreciate the true occupational risk of human immunodeficiency virus infection and 31% did not know that needle stick injury is the commonest mode of occupational acquisition (Mosweu et. al., 2005).

In an another study that explored perception of healthcare workers on occupational risk of HIV transmission in North-West Ethiopia, all the respondents were aware of the risk of acquiring HIV in health care setting. The study concluded that healthcare professionals are well aware of the possibility of HIV transmission associated with their practice (Alemie. 2012).

In another study in Tanzania, a substantial proportion of studied healthcare worker had little knowledge on occupational exposure to HIV. Training and use of PPE extended to other clinical and non-clinical health staff was advocated (Tesfay and Habtewold, 2014).

Another study conducted among primarily healthcare workers in Ghana showed that 21% of staff perceived that they were not at risk of exposure to blood-borne virus. Educational intervention was found to be effective to increase the knowledge of healthcare workers on occupational exposure (Tesfay and Habtewold, 2014).

In a survey in Nigeria, health care workers were shown to be unnecessarily exposed to HIV infection due to inadequate hygienic practices and unavailability of material and equipment needed for protection where available, they were found to be inconsistently used(Akinboro et. al., 2012).

In Northern Nigerian study where the risk perception of healthcare workers to HIV was accessed, 19.2% of all study participants believe that they are not at risk of being infected with HIV/AIDS as a result of occupational exposure The lower age group showed (<30yrs) was shown to have a statistically significant higher risk perception than the older health care. Those in public health facilities believe that they had a higher risk of being infected than those in private healthcare facility. Healthcare workers with less than five years of experience and nurses/midwifes believe they had greater risk of occupational exposure than other group of healthcare workers (Amoran, 2013).

Another study conducted among community health workers on risk perception of occupational exposure to HIV in Ibadan, South-West Nigeria showed a very high risk perception among health care workers regarding occupational exposure to HIV and AIDs but a poor compliance with universal precaution in their professional duties. It was observed that health care workers perception of risk and workplace safety climate did not influence their compliance with universal precautions (Akinboro et. al., 2012; Miceli et. al., 2005).

Reports indicate that safety practices are effective in preventing both occupational exposure incidents and associated infections. Due to this, surveillance of healthcare workers compliance to safety practices is an important element of occupational and nosocomial infection control as it enables assessment of risk from occupational exposure to infection. Studies have extensively reported suboptimal and non-uniform adherence to safety practices by healthcare worker in both developed and developing countries(Martins et. al., 2012).

In China, Yunnan, a study on occupational exposure revealed that most occupational exposures accidents happened during emergencies, when healthcare did not have time to consider self-protection and that exposure to HIV caused adverse psychological pressure, such as stress and anxiety. It also noted that compliance with personal protective equipment

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in the phase of emergency was poor (Chunqing et. al., 2009). Emphasis are been laid on the use of retractable needle and safe disposal of hospital waste as well as use of personal protective equipment so as to eliminate occupational exposure and promote safe working environment. However, healthcare workers hardly apply conform to proper safety regulations. Take for instance a study conducted in Eastern Nigeria noted that doctors who by virtue of their long and higher level of educational training are supposed to know and practice better, rather exhibit less caution in potentially dangerous situation (Enwere & Diwe, 2014). Even in instances where health workers demonstrate wiliness to adhere to infection prevention, supply of such protective equipment is not adequate. In an Ethiopian study on health care workers safety that revealed high level of occupational exposure, 44.8% of study subjects reported their dissatisfaction by the supply of infection prevention materials. It also noted that healthcare workers had sub-optimal practices and unfavorable attitudes related to standard precaution such as needle recapping and discriminatory attitudes towards HIV patients (Reda et. al., 2010).

2.5 Safety Protocol/Regulation Availability and Health Waste Management

Inadequate facilities for treatment and disposal of injection materials and other healthcare waste; over prescription and inadequate use of injections ,limited guidelines on injection safety practice including the care of needle stick injuries at all health care level, others issues are;

Poor capacity of healthcare workers to implement the guidelines on injection safety practices including the care of needle stick injuries and weak inter-sectoral collaboration between key stake holders on healthcare waste management, inadequate personal protective equipment for health workers and waste handlers are key issues affecting health workers occupational safety(Anon, 2015).

2.5.1 Waste Management

Work environment have peculiar health-related risk which very often constitute hazard to the healthcare workers, the patient and patient relatives seeking medical care and to

the environment. A safe and acceptable practice is that which is devoid of avoidable hazard where services are rendered using appropriate equipment in such that there is no harm to the recipient; does not expose the provider to any avoidable risk and does not result in any waste that is dangerous to other people (the community) (Enwere and Diwe, 2014).

Risk and hazards associated with healthcare waste include: needle stick injuries; transmission of infections or disease; re-use of some types of waste (accidental or intentional); fire and public nuisance (offensive smells, unsightly debris). Eighty percent (80%) of healthcare waste is general waste or low risk waste and 20% can be dangerous and referred to as risk waste while 1% of risk wastes are sharps waste. Waste bins are containers that are made of non-corrosive materials, leak proof with well-fitting lids. These waste bins as well as their liners are colored black, red, and yellow with biohazard sign for disposal of the various categories of healthcare waste. Waste minimization ,segregation, handling and storage, transportation, treatment and destruction before final disposal are the steps involved in healthcare waste management (Enwere and Diwe, 2014).

NSSIs are common public health problems to healthcare workers. The promotion of adequate working conditions, elimination of excess injections and adherence to universal precautions are good inputs for the control of potential infections due to occupational exposures (Rapparini, 2006).

2.6 Determinants of Occupational Exposure to HIV Infection

The risk of healthcare workers to acquire human immunodeficiency virus or blood borne pathogens after an occupational exposure depends on multiple factors like high prevalence of the infection in the specific population, frequency of exposure (activities capable of transmitting the infection agent), nature and efficiency of transmission of exposure (percutaneous injury has increased risk of transmission compared with exposure to mucosa membrane or skin), high viral load, or patients with advanced illness (Sangwan et. al., 2011). Despite the high prevalence of blood-borne pathogens in many developing countries, documentation of infection caused by occupational exposure is inadequate. The factors that are attributable to this are categorized as

sociodemographic, work environment or organizational factor, and behavioral factors (Tesfay & Habtewold, 2014).

2.6.1 Work Related Determinants

Study done on specific groups of health professional indicates that occupational exposure is real risk and is attributable to some work related factors. The study done on nurse showed that the percentage of nurses experiencing needle stick injury by discharge of their duties was 79.7%. The rate of needle stick injury among the study subjects was high in subjects with age less than 24 and less than 4 years of nursing experience, working in the surgical intensive care units, and working for more than 8 hrs. per day (Pring et. al., 2014).

2.6.2 Behavioral Determinants

While NSI accounts for more of the risk of healthcare workers to acquiring occupational HIV, yet in many developing countries the high demand for injections derived from the belief that they are more effective than other forms of treatment. Therefore unnecessary administration on demand is prevalent and hence expanding health workers risk to occupational exposure to HIV infections (Akinboro et. al., 2012). Available data from developing countries shows that adherence to the standard precaution and documentation of occupational exposure are suboptimal and the knowledge about the risk factor among the healthcare workers is poor.

2.6.3 Organizational Related Determinants

In a study in Ethiopia, it was demonstrated that prevalence of occupational exposure to HIV infection among healthcare workers was high and lack of training on infection prevention and patient safety and night work shift were found to be the independent predictors of occupational exposure to HIV infection among health care workers.(Reda et. al., 2010).To this end the most common determinant factors are year of working experience, total working hours per week, number of patient, and perceived knowledge on risk of human immunodeficiency virus (Beyene and Tadesse, 1996).

Having more than 10 years or more work in health service and being over 39yrs were risk factors to occupational exposure of healthcare workers (Yimechew et. al., 2013).

Some other studies also indicated that injuries were more frequent during extended work compared with none extended and the extent of occupational exposure among healthcare workers. Decreasing the work load of some specific healthcare workers was indicated as one measure of decreasing the occurrence of exposure (Tesfay and Habtewold, 2014)

Another study in Ethiopia that was carried out among 276 health care workers, lack of training on infection prevention and patient safety were found to be an independent predictor of occupational exposure to HIV infection (Beyene and Tadesse, 1996). In Uganda research, it was found in a study of occupational exposure to HIV that lack of protective device was among the predisposing factors to occupational HIV infection (Kumakech et. al., 2011)

After reviewing available literatures within reach, from general knowledge of HIV/AIDs and occupational risk exposure with possible transmission of infection, across the globe there is no dissenting view to the prevalence of occupational exposure to HIV and other blood borne pathogens among healthcare workers. However, occupational risk of exposure is more in developing countries when compared with the developed countries of the world. More so, there is better surveillance and management of occupational risk in the developed countries. Measures aimed at reducing and managing occupational risk is poor and inadequate in resource constrained economies and where blood-borne pathogens are prevalent. Available studies on occupational exposure are centered on the healthcare workers in the general healthcare facility setting that admits HIV patient by chance. In this regard, there is limited information on healthcare workers in HIV treatment centers whose vulnerability is higher compared to general group of healthcare workers.

Again, no much study have revealed or compared occupational exposure between private and public based healthcare workers, and there are limited studies on occupational exposure with emphasis on high prevalence settings to HIV infection. However, every study suggests that healthcare worker protection is paramount to the survival and sustenance of healthcare workers whose population is disproportionate with respect to increasing healthcare services.

Factors associated with higher risk of occupational exposure include organizational factors such as lack of training of healthcare workers on infection prevention and patient safety, inadequate provision of personal protective equipment, clear protocol on infection prevention and control as well as surveillance system to monitor the trend of occupational exposures. There is also lack of post exposure prophylaxis for exposed persons in developing countries especially in Asia and Africa. Other factors identified include behavior of healthcare workers towards infection prevention. Most healthcare workers are said not to protect themselves adequately despite the availability of personal protective equipment. On the other hand some healthcare workers have low perception of occupational risk while others neglect written guidelines on infection prevention. The association of these factors is illustrated by conceptual frame work in figure 1 which was developed after reviewing literature.

2.7 Conceptual Framework

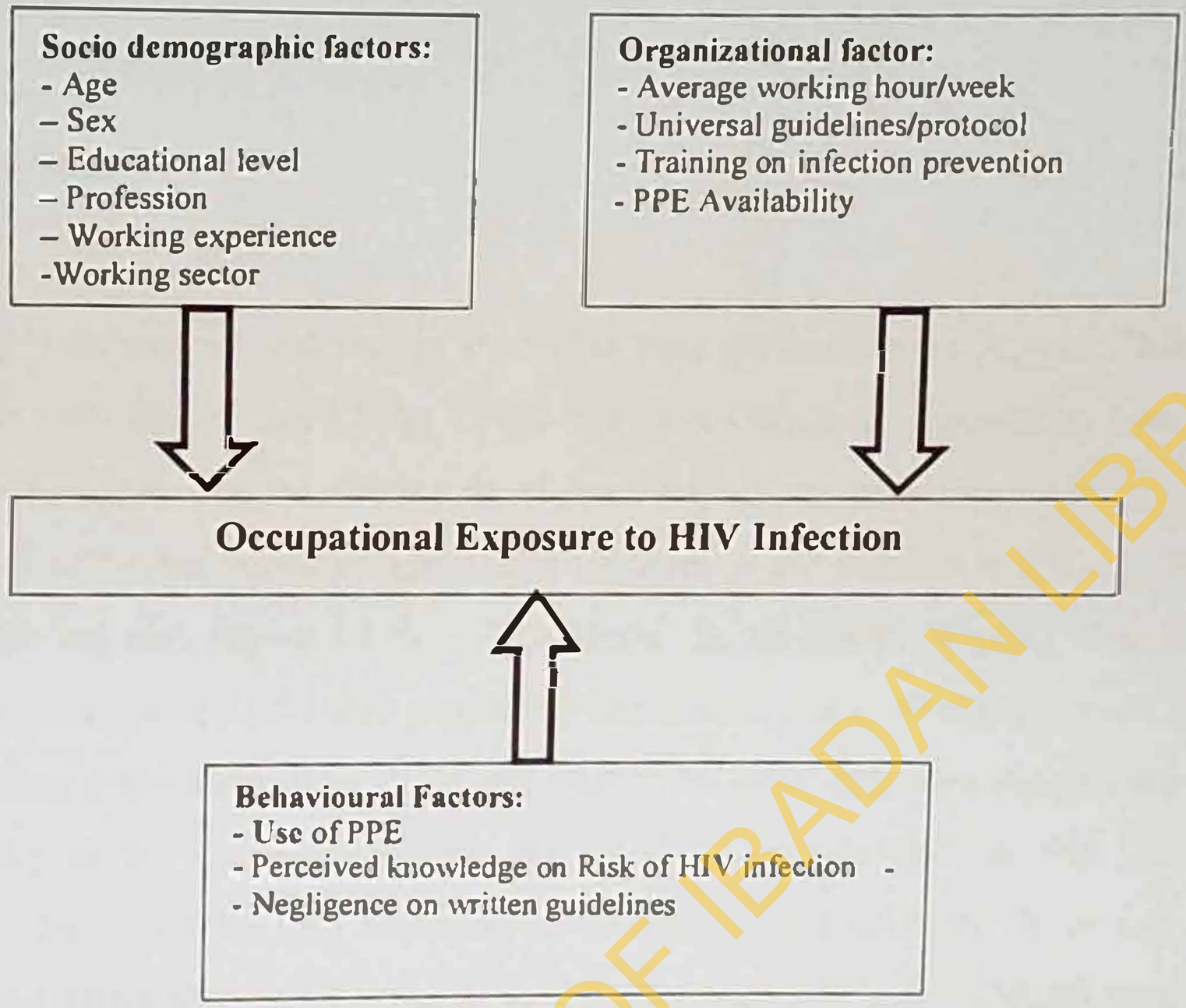

Figure 1: Conceptual Frame work and Variable Specification for Study in PH Metropolis, South-south, Nigeria 2016.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was carried out within Port Harcourt metropolis in Rivers State. Port Harcourt metropolis consists of two LGAs - Port Harcourt City and Obio-Akpo (see appendix 1 and 2). This metropolis houses about half of the state human population and a collection of half the number of health facilities and health workers in the state. It is also the capital of Rivers State in the oil rich region of the Niger Delta, South-South Nigeria. The State has a total population of about 5, 184, 400 projected from 2006 National census with a growth rate of 3.0% making it the sixth most populous state in Nigeria. It is strategic as the hob of oil and gas activity in the oil reach region. Rivers State is bounded on the South by Atlantic Ocean, to the North by Imo State and to the East by Akwa Ibom State and to the west by Bayelsa and Delta States. At present, Rivers State has 374 public health facilities which are dispersed at different locations in the state. The public health facilities render primary care by Model Health Centers, while the secondary care is done by the General Hospital and a Specialist Hospital. According to information from State AIDS and STI Control programme, in 2015 (SASCAP), there are 89 PMTCT sites of private and public facility within Port Harcourt.

There are several control programs for HIV that is coordinated by the State Ministry of Health through partners and donors support. The State Agency for the Control of HIV-AIDS (SACA) takes charge of HIV prevention and control programmes coordination, while State AIDS and STI Control Programme (SASCAP) takes charge of health sector-driven prevention intervention in the state. Both are government agencies set up to control HIV infection. Recently in 2016, the State Ministry of Health has set up in line with Federal Government directive an infection prevention committee in the State as informed by SASCAP.

3.2 Study Design

The study was a descriptive cross-sectional health facility based.

3.3 Study Population

The study population consists of healthcare workers in primary and secondary healthcare institutions. Public and private facilities within the two Local Government Areas that make up Port Harcourt metropolis and that are involved in PMCTC activities constitute the study population (see appendix 2 and 3). Healthcare workers in PMTCT sites are engaged in activities such as HIV counselling and testing, treatment of illnesses, monitoring of pregnancy and deliveries as well as care for HIV pregnant mothers and their new born babies. In treating or attending to patients, certain invasive procedures are carried out on the patient. These facilities are not restricted to HIV patients alone though their day-to-day activities require caring for HIV infected patients and their interest is on HIV patients. The healthcare workers whose day to day activities expose them to risk of occupational infection to HIV are the Doctors, Nurses, laboratory scientist, or technicians and Environmental workers and are the target population for this study.

3.3.1 Inclusion Criteria

All healthcare workers in the selected health centre and hospitals who attend to patients and have potential of being exposed to body fluids of patient and by extension to human immunodeficiency virus in their day to day professional activities. These include; Nurses Doctors, Laboratory scientist/technician, Midwives and Environmental health workers.

3.3.2 Exclusion Criteria

The exclusion criteria in this study include (1)students who are temporarily assigned for training purpose and (2) Workers who are less than 6 months into posting at present work place (3) eligible study subjects who are on leave or are not on duty as at the time questionnaire was administered in the health facility (4) Health care worker that had assumed administrative responsibility and therefore are not in active clinical practice was

excluded (5) Health care workers who decline on giving informed consent were also excluded.

3.4 Sample Size Determination

The sample size for the study was determined using,

$$n = \frac{Z^2_{\alpha}\, pq}{d^2}$$ (Lwanga and Lemeshow 1991)

Where,

n = the minimum sample size

Z_{α} = the standard normal deviate corresponding to level of significance of 5%=1.96

d = the desired level of precision, 0.05

p = proportion of HCW exposed to needle stick injury in Northern Uganda = 0.28 (Odonkara *et al*; 2012)

q =1- p = 0.72

$$n = \frac{(1.96)^2 \times 0.28 \times 0.72}{(0.05)^2}$$

n= 310

Non response rate

n= 1/ (1-non response)

10% non-response rate brings n=341

3.5 Sampling Technique

Multiple Stage Sampling technique was used to get individual respondents.

Stage 1: Health Facility Selection:

Out of 56 health facilities within Port Harcourt metropolis designated PMTCT sites consisting of 22 public and 34 private , 22 public facilities were included and 22 was selected by simple random sampling from the private facilities within the metropolis (see appendix 3 and 6 - 9).

Stage 2: Selection of Health Workers from Health Facility:

The study sample size of 341 was divided equally among the 44 selected health facilities giving 6 participants per facility.

Stage 3: Selection of Cadre Participant:

The healthcare worker cadres of interest in this study are doctors, nurses, laboratory scientist and environmental health workers. At the facility, one health care worker was selected by balloting to represent each cadre of health worker and to pick the remaining two health workers. This was selected out of the remaining health workers among the four cadres of healthcare workers in the facility. Where a facility has six or less number of healthcare workers of interest, all where studied and the remaining made up from another facility.

3.6 Data Collection Method

3.6.1 Description and Design of Study Instruments

Quantitative data was collected using semi structured interviewer administered questionnaire (see appendix 5). The questionnaire had three sections; Section A: socio-demographic characteristics of healthcare workers such as age, sex and occupation. Section B: are on opinions, knowledge, understanding and experiences on PEP, occupational risk exposure to HIV, and Section C: are on infection prevention and the determinant factors to occupational

risk exposure to HIV infection. The questionnaire was adopted from previous similar published works (Bashorun et. al., 2014; Amoran, 2013; Gumodoka et. al., 1997)

3.6.2 Training of Research Assistant

Eight research assistants and supervisors who consisted of healthcare workers because of easy adaptability were trained and supervised on how to administer questionnaire. They were made to remain focused by being reminded at every opportunity on the importance of their contribution to the success of this study by having them adhere strictly to study protocol. Daily review meetings were held to review daily work performance despite regular communications at the field.

3.6.3 Pre-test of Study Instruments

Pretest of the questionnaire was conducted on 30 healthcare workers working in five health institutions that were selected for the study before the actual data collection. Modification on logical sequence, simplicity, and clarity of questionnaire was done using the findings at pre-test.

3.6.4 Field Work

Field work was carried out after ethical approval has been gotten from the State Ministry of Health as well as permission granted from the heads of study facilities (see appendix 10. 11 and 12). Field work lasted for two weeks commencing from 10am to 3pm daily except weekends where few workers were found in health care facilities.

3.7 Data Management and Analysis

Data is stored electronically and in a password protected format to promote confidentiality. Data is secured in coded soft copies to preserve confidentiality. Individual names were avoided so as to promote confidentiality.

3.7.1 Dependent Variable

Occupational exposure of healthcare workers to Human Immunodeficiency Virus infection

3.7.2 Independent Variable

(i) Socio-demographic factors such as age, sex, educational qualification and professional cadre.

(ii) Organizational factors such as average work hour of health worker per week, training on infection prevention, provision of universal safety guidelines and protocol as well as availability of personal protective equipment.

(iii) Behavioral factors such as regular use of personal protective equipment, negligence on written guidelines and occupational risk perception.

3.7.3 Statistical Analysis

Data was analyzed by the researcher using Epi info 7 and SPSS statistical software. Collected and entered quantitative data was inspected for completeness and for missing data by eye balling and frequency checks. Following a satisfactorily cleaned data, univariate analysis was done and expressed as percentages, mean and standard deviation. The frequency distribution of dependent and independent variables was organized by frequency tables, graphs, and charts. Chi-square test was used to determine the associations between dependent and independent categorical variables at 95% CI. Logistic regression was used to identify the factors associated

with occupational exposure to HIV among health care workers at 0.05 levels of significance.

3.8 Ethical Approval

Approvals of the Scientific and Ethical Committee of Rivers State Ministry of Health as well as that of the Ethical Committee of the Rivers State Hospital Management Board were sort and obtained (see appendix 10 and 11). Informed consent of each of the participant was also obtained after a careful and explicit explanation was made to them (see appendix 4). Before the commencement of interview, the questionnaire was read out to each participant and followed with explanations on his/her rights concerning willful participation in the study and the right to willfully withdraw at any point into the interview irrespective of previous consent without the fear of the slightest measure of victimization or penalization by any known form or means not even the loss of any entitlement as otherwise fully participated to the end of the interview.

Participants' confidentiality was assured and research assistance was trained to maintain confidentiality. Data record sheaths contained numbers for identification and distinguishing feature instead of respondents name so as to further maintain confidentiality. The study was beneficent and non-maleficent. Work was performed according to the guidelines for research stated by Federal Ministry of Health Nigeria.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic Characteristics of Respondents

A total of 337 healthcare providers working at PMTCT sites in Rivers State were assessed. One hundred and seventy-one (50.7%) of them were recruited from public health facilities while 166 (49.3%) were recruited from private health facilities. Seventy-eight (23.1%) of the respondents were between 20-29 years, 156 (46.3%) were between 30-39 years, 75 (22.3%) were between 40-49 years, 24 (7.1%) were between 50-59 years and 4 (1.2%) were 60 years and above. The mean age was 35.9±8.4 years.

Most (270, 80.1%) of the respondents were females, and were predominantly Christians (336, 99.7%). Sixty-three (18.7%) of the respondents were doctors, 124 (36.8%) were nurses, 52 (15.4%) were laboratory scientists or technicians, and 98 (29.1%) were environmental health workers.

Majority (243, 7.1%) of the respondents had completed tertiary education. Over one-third (125, 37.1%) of the respondents had worked for 10 years or more, and 246 (73%) worked for an average of 40 hours or more. See Table 4.1.

Table 4.1: Socio-demographic Characteristics of Healthcare Workers in PMTCT sites within PH metropolis, April 2016

Variable	Frequency (n=337)	Percent
Age (years)		
20-29	78	23.1
30-39	156	46.3
40≥	103	30.6
Mean age ± SD (years)	35.89±8.44	
Sex		
Male	67	19.9
Female	270	80.1
Occupational cadre		
Laboratory scientist/technician	52	15.4
Doctor	63	18.7
Environmental health worker	98	29.1
Nurse/midwife	124	36.8
Educational qualification		
At best primary	23	6.8
Secondary	71	21.1
Tertiary	243	72.1
Years of experience		
≥10 years	125	37.1
<10 years	212	62.9
Health Facility type		
Private	166	49.3
Public	171	50.7
Average working hour per week		
<40 hours	91	27.0
≥40 hours	246	73.0

4.2 Prevalence of Occupational Exposure to HIV Infection among healthcare Workers in PMTCT sites Rivers State

The overall prevalence of occupational exposure to HIV infection among health care providers in PMTCT sites in Rivers State was 45.4%. However, the prevalence varied among various socio-demographic variables assessed. Prevalence of occupational exposure to HIV infection was 40.9% among healthcare provider in public health facilities and 50% among healthcare providers in private health facilities. The prevalence was 154.7% among healthcare worker between 40 years and above, 42.3% among those between 30-39 years and 41% among those between 20-29 years.

Prevalence was 53.7% in males and 43.3% in females. Along occupational cadre, the prevalence was as high as 69.8% among doctors and as low as 20.4% among environmental health workers. A prevalence of 53.5% was observed among healthcare providers who had tertiary education, 25.4% among those who had secondary education, and 23.8% among those who had at most primary education. Healthcare workers with an average working experience less than 10 years had prevalence of 42% while those with 10 years of experience or more had a prevalence of 51.2%. The prevalence of occupational exposure was 50.5% for healthcare workers who worked less than 40 hours in a week, and 43.5% for those who worked 40 hours or more in a week. See table 4.2.

Table 4.2: Prevalence of Occupational Exposure to HIV Infection among Health care Workers in PMTCT Sites Rivers State, April 2016

	N	Experienced occupational exposure	Percent
Health care provider in PMTCT sites	337	153	45.40
Age (Years)			
20-29	78	32	41.0
30-39	156	66	42.3
≥ 40	103	106.7	154.7
Sex			
Male	67	36	53.7
Female	270	117	43.3
Occupational cadre			
Nurse/midwife	124	64	51.6
Environmental health worker	98	20	20.4
Doctor	63	44	69.8
Laboratory scientist/technician	52	25	48.1
Educational qualification			
At most Primary	23	5	23.8
Secondary	71	18	25.4
Tertiary	243	130	53.5
Years of experience			
<10 years	212	89	42.0
≥10 years	125	64	51.2
Facility type			
Public	171	70	40.9
Private	166	83	50.0
Average working hour per week			
<40 hours	91	46	50.5
≥40 hours	246	107	43.5

4.3 Risk Perception Regarding Occupational Exposure and the Practice of Standard Precaution Procedure.

4.3.1 Perception Towards Risk of HIV Acquisition and workplace Safety

Three hundred and eighteen (94.3%) of healthcare workers perceived they are at substancial risk of HIV acquisition. Majority, 147(46.2%) of the respondents who perceived they are at risk are between the age of 30-39 years. Those within the age of 40 and above were 99(31.1%), then 72(22.6%) were between the ages of 20-29. Out of the 318 respondents, 254(79.9) were female. With respect to occupational cadre, 117(36.8%) were nurses and 48(15.1%) were laboratory workers. Nineteen point two percent(19.2) were doctors while 92(28.9%) were environmental health workers. Health care workers who had tertiary academic qualification had the highest perception rate at 231(72.6%) while healthcare workers who at most had primary education was 22(6.9%). Secondary educational qualification was 65(20.4) of respondents with positive perception on occupational exposure risk. Years of experience less than 10 years was 203(63.8%) and average working hours greater than or equals to 40 hours was 231(72.6%).This is shown in Table 4.3.1 below.

When asked what cadre of health worker is perceived to be more at risk compared with other categories of healthcare workers by cadre,different responses were given. Among the interviewed healthcare workers, 118 (35.0%) believed it was the nurses that are at the greatest risk of occupational exposure to HIV infection while 91(27.0) opined that the environmental health workers are most at risk. Sixty seven (13.9%) of study participants believe doctors are most at risk while 13 (3.9%) could not tell what category of healthcare worker were more exposed to the risk of occupational acquisition of HIV than the other.This is shown in the Figure 4.3.1 below.

Table 4.3.1:Health care workers with Risk Perception Regarding Occupational Exposure

Characteristics of Health care provider in PMTCT sites	Number (N=318)	Percent
Age (Years)		
20-29	72	22.6
30-39	147	46.2
> 40	99	31.1
Sex		
Male	64	20.1
Female	254	79.9
Occupational cadre		
Nurse/midwife	117	36.9
Environmental health worker	92	28.9
Doctor	61	19.2
Laboratory scientist/technician	48	15.1
Educational qualification		
At most Primary	22	6.9
Secondary	65	20.4
Tertiary	231	72.6
Years of experience		
<10 years	203	63.8
≥10 years	115	36.2
Facility type		
Public	165	51.9
Private	153	48.1
Average working hour per week		
<40 hours	87	27.4
≥40 hours	231	72.6

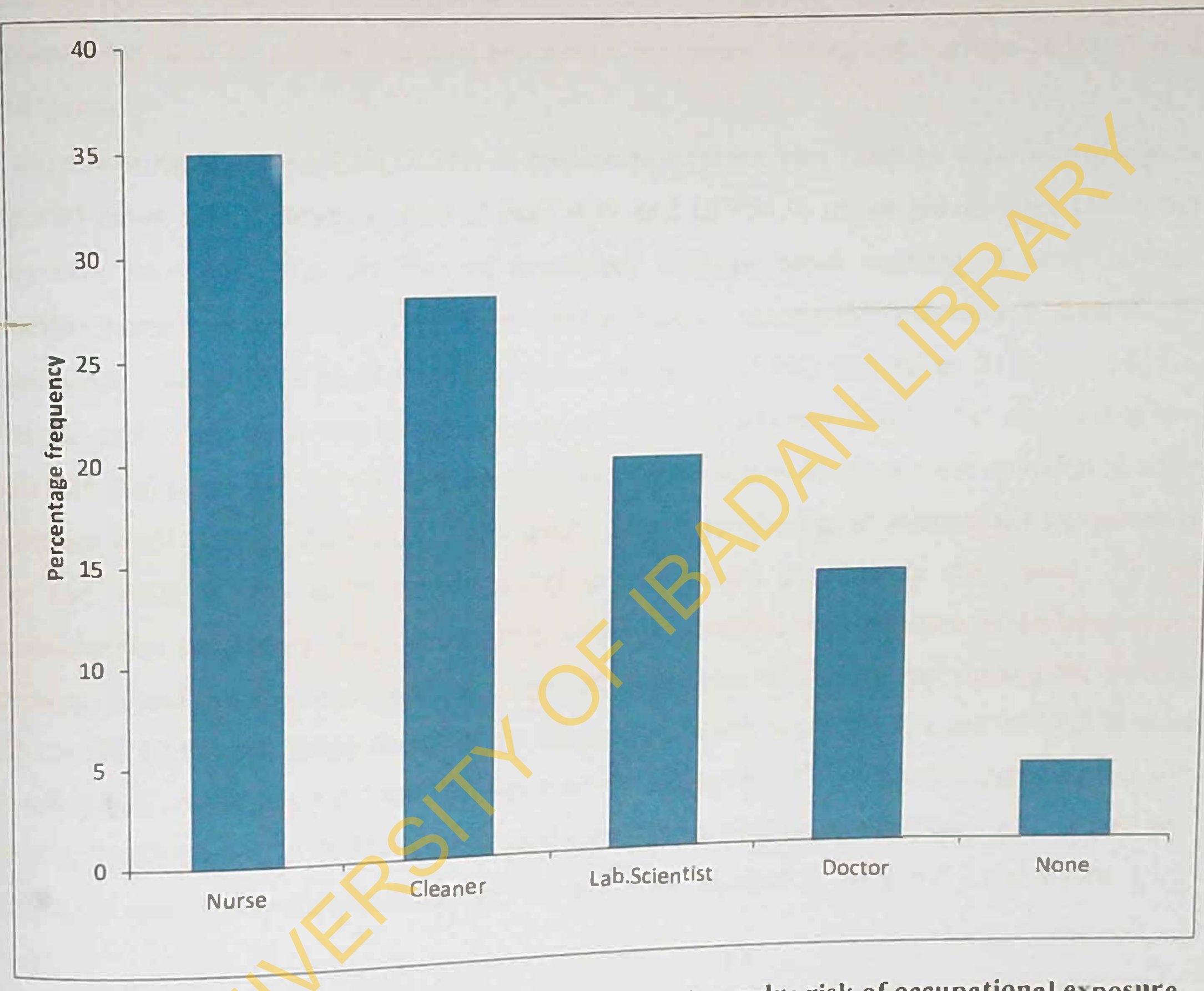

Figure 4.3.1 HCW View of professional cadre at greater cadre risk of occupational exposure

4.3.2 Health Workers Practice of Standard Precaution

Eleven safety and infection prevention parameters common among almost all categories of health workers were used to access standard precaution procedure among the various cadre of study participants.

On the use of hand gloves, 123(36.5%) of healthcare workers used hand gloves always, whereas 29(8.6%) never wears gloves in line of their duty and 185(54.9) wears gloves only sometimes. More than four fifth, 305 (90.5%), of healthcare workers stated washing of hands always, 22(6.5%) sometimes and 10(3.0%) never washes hands. Among the interviewed, 224(66.5%) wiped hands with spirit or hand sanitizers always while 94(27.9%) sometimes do so and 19 (5.6) never did such. Face mask was worn always by 117(34.7%) whereas 135(40.1%) wear sometimes and 85(25.2%) never did. In the decontamination of instruments which prevent infection to other health users 45(13.3%) of the study participants never decontaminated instruments immediately after use while 2,799 (82.8%) always did decontaminate instruments they used, 13(3.9) decontaminates sometimes. The use of safety boxes is the appropriate practice in the health care environment and healthcare workers are expected to practice this always but among the studied subjects,278(82.5) used safety boxes in the disposal of health waste always .while 17(5.0) used the safety box sometimes but 32(9.5) never used the safety box. Of the studied participants, 168 (49.0%), 29(8.6%) and 23 (6.8%) always used closed covered shoes, wear heavy duty gloves and heavy duty aprons respectively. Summary of this is as reported in table 4.3.2 and figure 4.3.2 below.

Figure 4.3.2 below illustrates the disposal of sharps in the facilities. Among the study participants, 237(70.3%) of respondents dispose sharps into containers set aside for sharps disposal, while48 (14.2%) destroy sharps in form of needle in needle destroyer, 25(7.4%) bury sharps in pit and 3.9% discard sharps into general waste containers. Four point two (4.2%) dispose sharps by means not identified by researchers.

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Table 4.3.2: Practice of Infection Prevention Procedures among Healthcare Workers in PMTCT sites

Variable	Always	Sometimes	Never
Wear gloves	123(36.5)	185(54.9)	29(8.6)
Wash hands	305(90.5)	22(6.5)	10(3.0)
Wear apron	112(34.7)	145(43.0)	75(22.3)
Wear goggle	79(23.4)	63(18.7)	195(57.9)
Wear face mask	117(34.7)	135(40.1)	85(25.2)
Wipe hands with spirit/hand sanitizer	224(66.5)	94(27.9)	19(5.6)
Decontaminate instruments after use	279(82.8)	13(3.9)	45(13.3)
Use safety boxes	278(82.5)	17(5.0)	32(9.5)
Put on closed/covered shoes	165(49.0)	113(33.5)	59(17.5)
Wear heavy duty gloves	29(8.6)	112(33.2)	196(58.2)
Wear heavy duty aprons	23(6.8)	90(26.7)	224(66.5)

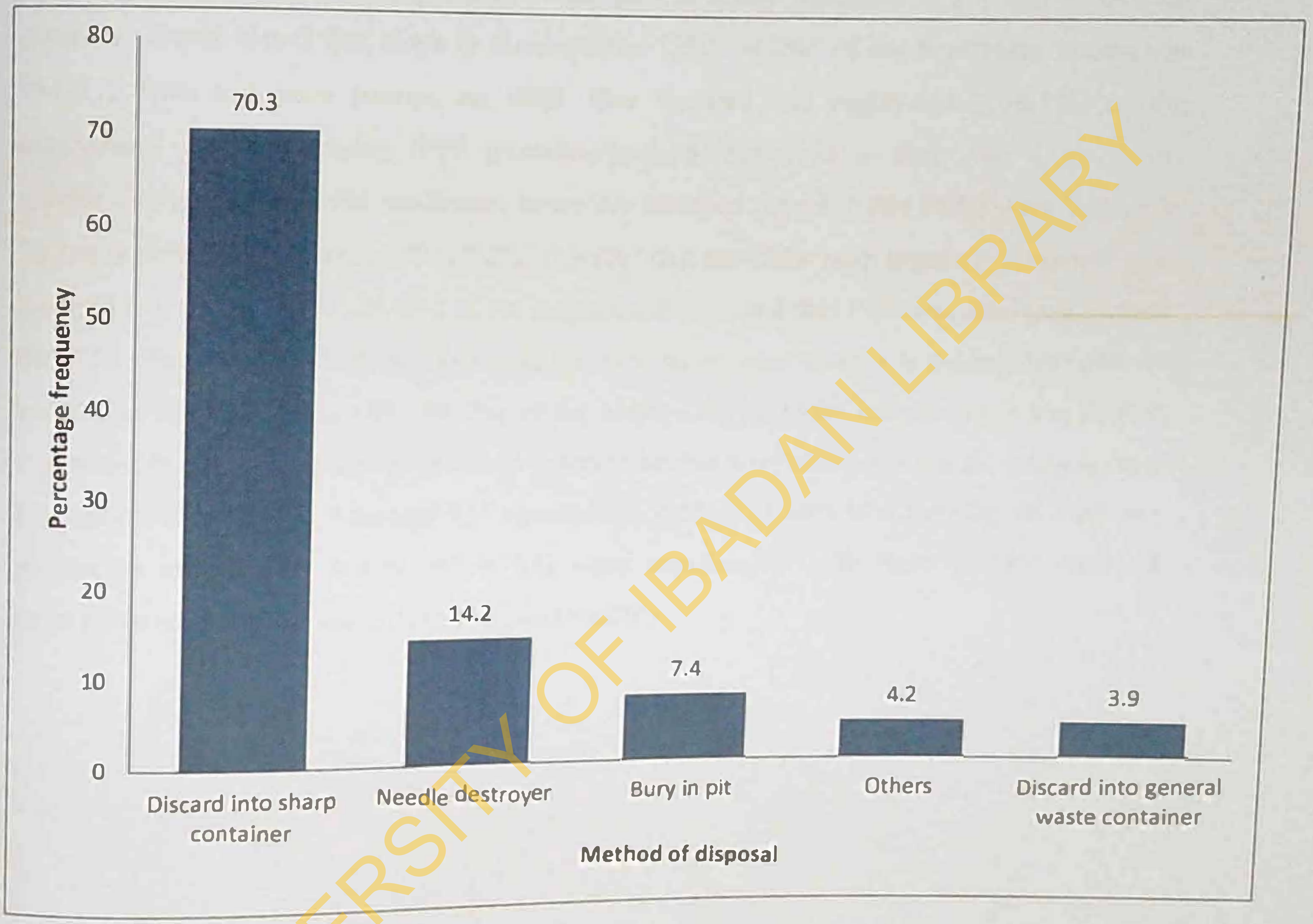

Figure 3: Methods of Sharps Disposal in PMTCT Sites, PH, 2016

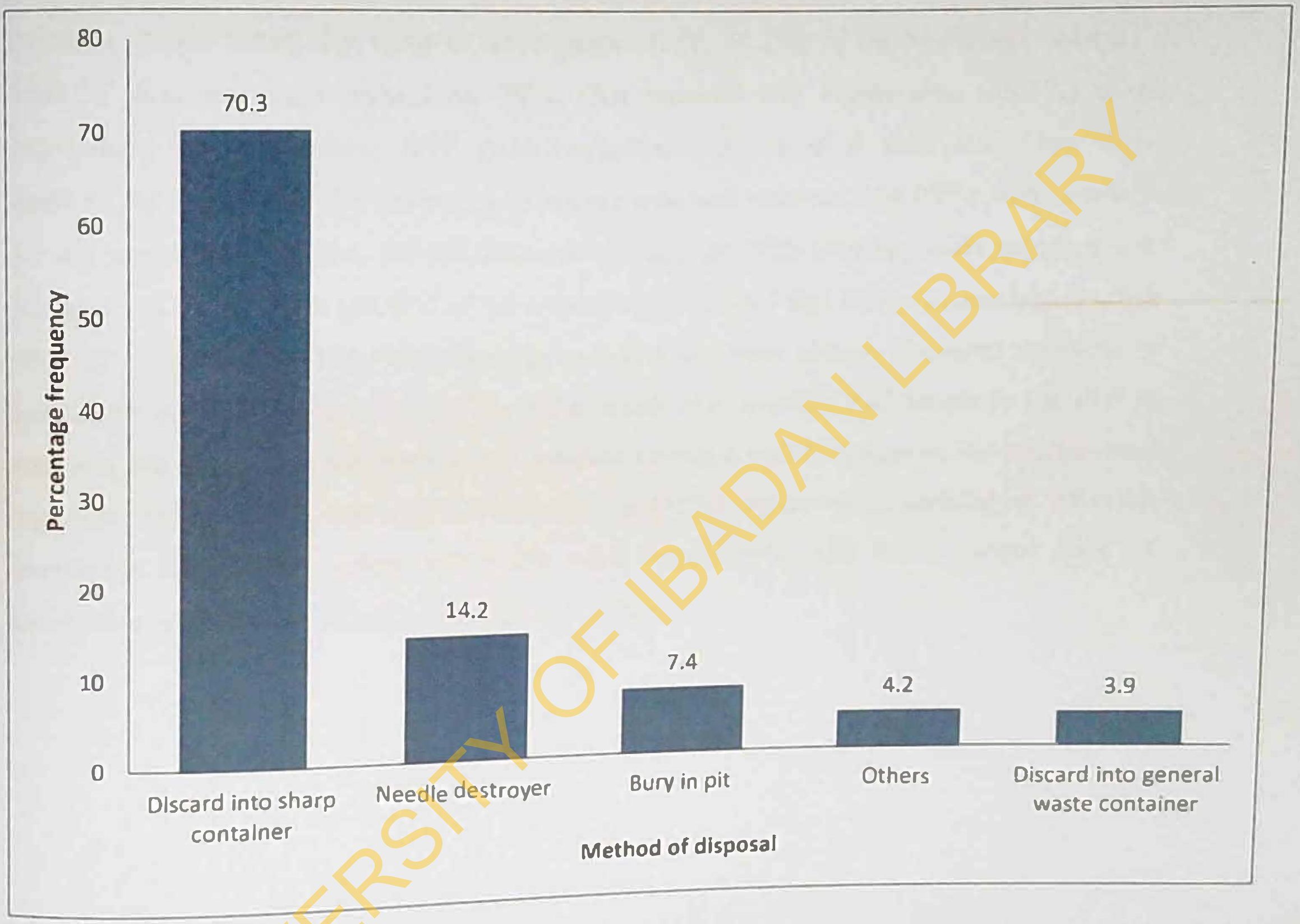

Figure 3: Methods of Sharps Disposal in PMTCT Sites, PH, 2016

4.3 Safety Protocol, Infection Prevention and Patient Safety Standards at PMTCT Sites

The safety protocol, infection prevention and patient safety standards at PMTCT sites were assessed. It was found that close to three-quarter (250, 74.2%) of the healthcare workers at PMTCT sites had been trained on IPPS. One hundred and eighty-nine (56.1%) of the respondents reported having IPPS guideline/protocol displayed in their site. Over three-quarter (262, 77.7%) of the healthcare providers assessed reported that PPEs were available for use at their PMTCT site; 176 (67.2%) reported that the PPEs were regularly supplied. One hundred and eighty-eight (55.8%) of the respondents reported that PEP was available at their PMTCT site majority (176, 93.6%) reported that there were always someone available to administer the PEP. Only 183 (54.3%) of the health care provider had access to the PEP at site, and 206 (61.1%) of the respondents reported having a reporting system for occupational exposure. See table 4.3. Amongst 337 respondents (98%) requested for training on infection prevention and patient safety, while 2% were comfortable with their present state of knowledge on infection prevention and patient safety.

Table 4.3: Infection Prevention and Patient Safety Standards at PMTCT sites

Variable	Frequency	Percent
Have been trained on IPPS (n=337)		
Yes	250	74.2
No	87	25.8
When last trained on IPPS (n=250)		
Less than a year	114	45.6
More than a year	136	54.4
PPE available for use at PMTCT site (n=337)		
Yes	262	77.7
No	75	22.3
PPE regularly supplied at site (n=262)		
Yes	176	67.2
No	86	32.8
PEP available at PMTCT site (n=337)		
Yes	188	55.8
No	149	44.2
Someone available to administer PEP (n=188)		
Yes	176	93.6
No	12	6.4
Health care workers with access to PEP at site (n=337)		
Yes	183	54.3
No	154	45.7
Presence of reporting system for occupational exposure(n=337)		
Yes	206	61.1
No	131	38.9

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Variable	Frequency	Percent
Have been trained on IPPS (n=337)		
Yes	250	74.2
No	87	25.8
When last trained on IPPS (n=250)		
Less than a year	114	45.6
More than a year	136	54.4
PPE available for use at PMTCT site (n=337)		
Yes	262	77.7
No	75	22.3
PPE regularly supplied at site (n=262)		
Yes	176	67.2
No	86	32.8
PEP available at PMTCT site (n=337)		
Yes	188	55.8
No	149	44.2
Someone available to administer PEP (n=188)		
Yes	176	93.6
No	12	6.4
Health care workers with access to PEP at site (n=337)		
Yes	183	54.3
No	154	45.7
Presence of reporting system for occupational exposure(n=337)		
Yes	206	61.1
No	131	38.9

4.5 Determinant Factors Associated with Risk of Occupational Exposure

Binary logistic regression was used to determine the predictors of occupational exposure and it was found that the health workers with at most primary level of education (OR=3.55; 95% CI for OR=2.08-6.06; p<0.001) and occupational cadre (OR=3.51; 95% CI for OR=1.94-6.32; p<0.001) were associated with risk of occupational exposure to HIV infection (Table 4.4).

Table 4.4: Bivariate Analysis Showing Association between Exposure Variables and Independent Variables

Variable	Exposure			X^2	P-value
	Yes n (%)	No n (%)	Total n (%)		
Age (Years)					
20-29	32(20.9)	46(25.0)	78(23.1)	3.862	0.145
30-39	66(43.1)	90(48.9)	156(46.3)		
40≥	55(35.9)	48(26.1)	103(30.6)		
Sex					
Male	36(23.5)	31(16.8)	67(19.9)	2.341	0.126
Female	117(76.5)	153(83.2)	270(80.1)		
Occupational cadre					
Doctor	44(28.8)	19(10.3)	63(18.7)	41.951	< 0.001*
Nurse/midwife	64(41.8)	60(33.6)	124(36.8)		
Laboratory scientist/technician	25(16.3)	27(14.7)	52(15.4)		
Environmental health worker	20(13.1)	78(42.4)	98(29.1)		
Educational qualification					
At most Primary	5(3.3)	18(9.8)	23(6.8)	23.135	< 0.001*
Secondary	18(11.8)	53(28.8)	71(21.1)		
Tertiary	130(85.0)	113(61.4)	243(72.1)		
Years of experience					
<10 years	89(58.2)	123(66.8)	212(67.9)	2.696	
≥10 years	64(41.8)	61(33.2)	125(37.1)		
Facility type					
Public	70(45.8)	101(54.9)	171(50.7)	2.792	0.097
Private	83(45.1)	83(45.1)	166(49.3)		
Average working hour per week					
<40 hours	46(30.1)	45(24.5)	91(27.0)	1.333	0.248
≥40 hours	107(69.9)	139(75.5)	246(73.0)		

*statistically significant

4.5 Determinants of Occupational Exposure

When the odds ratio was adjusted for confounders, doctors were seen to have 46.1% less likelihood of experiencing occupational exposure than nurses. Environmental health worker are about 4 time more likely of experiencing occupational exposure than nurses while lab scientists are about 1 time more likely to experience occupational exposure than nurses (p=0.669). The odds of occupational exposure to HIV infection among doctors were about two times higher than other healthcare workers [AOR=0.4; C.I=0.193-0.929; p=0.032]. HCWs whose working hours was greater than 40 hours were at higher risk of sustaining occupational exposure to HIV through percutaneous injuries when compared to their counterparts that work less than 40 hours in the week [AOR = 0.53; C.I = 0.301-0.919 ; p = 0.024] . This is shown in table (Table 4.5).

Table 4.5: Logistic Regression showing the determinants of occupational exposure

	Unadjusted Odds Ratio		Adjusted Odds Ratio	
variable	**OR(CI)**	**P-Value**	**OR(CI)**	**P-Value**
Age (Years)				
20-29	1.65(0.91 - 2.99)	0.100	1.78(0.86 – 3.71)	0.122
30-39	1.56(0.95 - 2.58)	0.081	1.80(0.99 – 3.28)	0.056
40≥	1		1	
Sex				
Male	1.52(0.89 – 2.60)	0.127	0.94(0.46 – 1.92)	0.859
Female	1		1	
Occupational cadre				
Doctor	0.46(0.24 – 0.88)	0.018*	0.43(0.20 – 0.93)	0.032*
Environmental health worker	4.16(2.27 – 7.61)	< 0.001*	11.15(2.19–56.78)	0.004*
Laboratory scientist/technician	1.15(0.60 – 2.20)	0.669	1.04(0.53 – 2.08)	0.902
Nurse/midwife	1		1	
Educational qualification				
At most Primary	4.14(1.49–11.51)	0.006*	0.40(0.06 - 2.72)	0.352
Secondary	3.39(1.88 – 6.11)	<0.001*	0.38(0.08 – 1.92)	0.243
Tertiary	1		1	
Years of experience				
<10 years	1.45(0.93 – 2.26)	0.101	0.94(0.55 – 1.63)	0.831
≥10 years	1			
Facility type				
Public	1.44(0.94 – 2.22)	0.095	1.62(0.99-2.65)	0.052
Private	1		1	
Average working hour per week				
<40 hours	0.75(0.47 – 1.22)	0.249	0.53(0.30 – 0.92)	0.024*
≥40 hours	1		1	

*statistically significant

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussions

Exposure to blood and potentially infectious body fluids have been recognized as potential health hazards in healthcare workers and is a practice of major concern for HCWs the world over (Yimechew et. al., 2013; Akinboro et. al., 2012). The result of this study undertaken in PMTCT sites within Port Harcourt metropolis in Rivers State indicates that occupational exposure to blood and body fluids by health care workers in the form of needle stick injuries, blood and body fluid splashes are common, with 45.4 %, nearly half of study participants, reporting one or more types of exposure in the previous year. This finding is comparable with the finding of a Ugandan study where 46% of the HCWs assessed reported been exposed to body fluid (Odongkara et. al., 2012). A similar finding was also reported by an Ethiopian study (Beyene and Tadesse, 1996). This finding was however higher than the finding of a study conducted in Northern Nigeria (Amoran, 2013). Despite the fact that it was conducted in a specialized setting of HIV care center, such as the PMTCT sites. On the contrary, higher prevalence of occupational exposure to HIV infection among healthcare workers has been observed by several other researchers. In a Kenyan study, the prevalence of occupational exposure to HIV infection among HCWs was 51% (Mbaisi et. al., 2013). Among HCWs in an Emergency Medical Hospital in the United State of America, the prevalence was 56.1% (Lee et. al., 1999). In a study conducted in Jimma Zone, Oromiya Region in South-West Ethiopian higher prevalence of 68.5% was reported (Tebeje and Hailu, 2010). In the studies conducted in London Teaching Hospital, North Ethiopia and Serbia, the prevalence of occupational

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5.1 Discussions

Exposure to blood and potentially infectious body fluids have been recognized as potential health hazards in healthcare workers and is a practice of major concern for HCWs the world over (Yimechew et. al., 2013; Akinboro et. al., 2012). The result of this study undertaken in PMTCT sites within Port Harcourt metropolis in Rivers State indicates that occupational exposure to blood and body fluids by health care workers in the form of needle stick injuries, blood and body fluid splashes are common, with 45.4 %, nearly half of study participants, reporting one or more types of exposure in the previous year. This finding is comparable with the finding of a Ugandan study where 46% of the HCWs assessed reported been exposed to body fluid (Odongkara et. al., 2012). A similar finding was also reported by an Ethiopian study (Beyene and Tadesse, 1996). This finding was however higher than the finding of a study conducted in Northern Nigeria (Amoran, 2013). Despite the fact that it was conducted in a specialized setting of HIV care center, such as the PMTCT sites. On the contrary, higher prevalence of occupational exposure to HIV infection among healthcare workers has been observed by several other researchers. In a Kenyan study, the prevalence of occupational exposure to HIV infection among HCWs was 51% (Mbaisi et. al., 2013). Among HCWs in an Emergency Medical Hospital in the United State of America, the prevalence was 56.1% (Lee et. al., 1999). In a study conducted in Jimma Zone, Oromiya Region in South-West Ethiopian higher prevalence of 68.5% was reported (Tebeje and Hailu, 2010). In the studies conducted in London Teaching Hospital, North Ethiopia and Serbia, the prevalence of occupational

exposure to HIV infection reported among HCWs were 76%, 88.6% and 98.4% respectively (Tesfay and Habtewold, 2014; Hamlyn and Easterbrook, 2007; Jovic-Vianes et. al., 2006). The difference in prevalence observed in these studies could be as a result of the difference in the study design, study area, inclusion/exclusion criteria, sample size, definition of occupational exposure and the socio-economic/developmental variation of the nations. The consciousness of the health care workers in PMTCT sites of high risk of occupational exposure and the limited parenteral practices being advocated for in the management of HIV patients could also contribute to this varying prevalence. As a specialized management setting for mostly HIV positive patients, healthcare workers apply caution when attending to patients compared to other healthcare settings were the HIV status of patients are not known prior to care of patients by health attendants.

It was also found that the prevalence of occupational exposure to HIV infection was higher among HCWs in private owned health facilities, as compared against those in public health facilities. This could not be comparable with other studies due to paucity of literature on studies conducted among HCWs in private health facilities. However, it could be that the higher prevalence observed among HCWs in private health facilities was due to the fact that private health facilities are profit oriented, and as such may not leave up to expectation in providing protective tools to their workers and/or conduct train and retrain of their HCWs on standard infection prevention techniques. In private health facilities, there is high tendency of shortage of manpower, in addition to extended work hours per week, for the purposes of maximum utilization of manpower with attendant maximization of profit, especially in the phase of prevailing economic challenges facing the country despite the willingness of workers adhering to infection prevention and patient safety.

The present study showed that the commonest route of exposure to HIV infection was through needle stick injury. This finding is in concordance with findings of other researchers (Odongkara et. al., 2012; Tebeje and Hailu, 2010; Jovic-Vianes et. al., 2006). While 27.7% and 60.3% of respondents in Odongkara et. al., (2012) and Tebeje and Hailu, (2010), respectively reported needle stick injury as the commonest mode of exposure to HIV infection among HCWs, as many as 89% of the HCWs reported same in Jovic-Vianes et. al., (2006). However, the report of some other studies deviated from this finding. In a North Ethiopian study, most (56.6%) of the HCWs assessed, reported that contact with potentially infectious fluid was the commonest route of exposure to HIV infection (Tesfay and Habtewold, 2014). A similar report was also noted in a study conducted in Tigray in Ethiopia, where it was shown that 56.3% of the occupational exposures to HIV infection were due to contact with blood and body fluid of infected persons (Gessessew and Kahsu, 2009).

The risk factor of transmission of HIV infection from patient to HCW has been shown by previous studies to be 0.3% in percutaneous exposure and 0.09% in mucocutaneous exposure. In this study, important factors that could influence the experience of health care workers occupational exposure to HIV infection were identified. Among these factors was lack of training on infection prevention and patient safety, unavailability and/or irregular supply of personal protective equipment, and unavailability of post exposure prophylaxis. Even where post exposure prophylaxis was available, it was observed that there were situations where there were shortages of personnel to administer it. Some of the facilities studied had no established system for reporting occupational exposures. This was similar to the situation reported in areas of comparable poor resource setting (Kumakech et. al., 2011).

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The proportions of these factors, irrespective of their magnitude was of high significance giving that the PMTCT site is a specialized site and HCWs in such site should be giving the highest opportunity to care for HIV positive patients without unnecessarily putting their health to the risk of HIV infection from their occupation.

The finding that 25.8% of the participants received no training on prevention of occupational exposure and that 98% of participants require training on infection prevention was one of the most important findings of this study and one that is easily most fixable. The lack of training among some participants is not unique to PMTCT sites within Port Harcourt metropolis nor to this study, as similar situations had been observed in other studies in developing countries (Beyene and Tadesse, 1996). In a Serbian study, it was found that only 20% of HCWs were informed about universal precautions and guideline on infection prevention (Jovic-Vianes et. al., 2006) while in an Ethiopian study, the reverse was the case (Tesfay and Habtewold, 2014) and this difference was attributed to the variations in training of HCWs on universal precautions to ameliorate the rate of occupational exposure. It is rare to organize special lessons on issues that border on occupational exposure to HIV virus aside the usual teachings on the principles and methods of infection prevention most of which are in passing during certain clinical medical procedures such as in venopuncture.

Reporting systems was found not to exist in some facilities as 38.9% of study participants reported. Without reporting of exposures, post exposure prophylaxis cannot be initiated. This study unfortunately, failed to investigate why reporting system for occupational exposure to HIV virus did not exist in such HIV special care center as the PMTCT sites. Unique to this study are some of the circumstances that expose health care workers to HIV infection.

The findings of this study revealed good perception of workplace safety amongst participants. This finding is similar to what was reported in study on risk perception

regarding HIV and AIDS in Ibadan among community healthcare workers in South-West Nigeria (Akinboro et. al., 2012). This is supported by the high prevalence of HIV infection and the increased campaign for HIV prevention programmes being organized in the state.

This study revealed that 16% of sampled PMTCT sites do not practice waste separation. Waste separation is an integral aspect of proper waste management that is aimed at minimizing/eliminating the hazards associated with healthcare waste. The suboptimal practice of waste management in 16% of sampled health facilities reflects poor appreciation of the benefits of proper waste management in these PMTCT sites. The implication is that environmental health workers are at constant risk of accidental injuries from sharps in the course of their duties, and so are other healthcare workers Interestingly, majority (70.3 %) of healthcare workers dispose of used needles and sharps after use into separate containers for sharps and when container is filled, a junior healthcare worker picks the needles one after the other from the sharps container into a needle destroyer, and this was done mostly during night shifts, with very high possibility of exposure to secondary needle prick injuries. Also noted in this present study was the suboptimal practice of infection prevention among healthcare workers in these HIV specialized sites. These findings are similar to the observations made by Enwere and Diwe, (2014). Healthcare workers who by virtue of their training are supposed to know and practice better, but tend to do otherwise in potentially dangerous situation.

Our research indicates that only 56% of the studied PMTCT sites had guidelines for infection prevention and patient safety readily on display in their facility and this is critical to infection prevention and patient safety. It is a reflection of the level of importance attached to healthcare worker, patient and the environment as these are the

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three clear critical components of infection prevention. This is similar to studies found in most developing countries as reported in a study conducted in Uganda (Kumakech et. al., 2011).

Doctors have 46.1% less likelihood of experiencing occupational exposure than nurses (p=0.018), environmental health worker are about 4.2 time more likely of experiencing occupational exposure than nurses (p<0.001), while lab scientist are about 1.2 time more likely to experience occupational exposure than nurses (p=0.669). This study found that the odds of occupational exposure to HIV infection among healthcare workers who are doctors were about two times higher than other healthcare workers and this is especially so because of their involvement in the care of patient. Doctors are the ones that carry out invasive procedures, do veno-puncture and repair episiotomy. They carry out all activities of all other cadre of healthcare worker and are not limited in the level of patient management. This is also similar in studies reported in England.

Our findings that HCWs whose working hours was greater than 40 hours were at higher risk of sustaining occupational exposure to HIV through percutaneous injuries and muco-cutaneous contaminations compared with other HCW are not unique as similar study reported same in Mongolia (Kakizaki et. al., 2011). This is so giving that fatigue and exhaustion would lead to lack of concentration and therefore predisposition to occupational exposure. Lack of concentration will readily lead to negligence of infection prevention procedures and also predispose to occupational exposure to HIV virus. This is also reported in similar studies from other developing countries where there was palpable disparity between HCWs and teaming number of HIV patients that need medical attention.

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The study was designed and carried out with the hope that it will provide basic information on occupational exposure of healthcare workers to policy makers for the management of health facility in the Rivers State. However, limitation of this study is that it relied on self-report rather than having record review of healthcare workers which is a better account of information as is in other developed countries. Unrestricted desirability bias is a potential limitation in self-reported studies such as this. This is because HCWs might report more socially acceptable responses than their actual day to day practice. We adjusted for this by recruiting data collectors who are healthcare workers and trained them on how to administer the questionnaire so as not to put respondents on defense but rather create the wiliness for them to appreciate the input the findings of this study will add in their day-to-day work.

Given the cross-sectional study design of this nature and limitations associated with it, hence we acknowledge the restrictions of result interpretation as findings from this study may not be generalized beyond studied PMTCT sites. Again, due to cross-sectional nature of this study, causal relationships between the risk factors and occupational exposure to human immunodeficiency virus infection may not be assumed. But future research with a longitudinal approach would be valuable especially in a follow up study to gain insight to weather and how disease state could emerge from these occupational exposures.

5.2 Conclusion

The high level of occupational exposure to blood and body fluid and consequent risk of infection among healthcare workers in PMTCT sites within Port Harcourt metropolis highlight the urgent need for intervention to enhance and sustain occupational safety of workers who have the statutory human right to remain safe in course of their humanitarian duty of caring for HIV positive patients. Occupational exposure of healthcare workers to HIV infection is predicated upon three main factors mainly: professional cadre of the health worker, average working hours in the week and level of education. These findings might represent the actual situation as professionals are the study subjects. To this end, it underscores the fact that the anticipated recall bias in a retrospective study as this is minimal and that occupational exposure in the phase of HIV/AIDs pandemic in an HIV high prevalence setting and in HIV care centre is a phenomenon that may not easily be given away to quick memory.

This study revealed that the prevalence of occupational exposure to HIV infection among HCWs in PMTCT sites within Port Harcourt Metropolis is high. It also revealed want of training on infection prevention and patient safety by HCW. It further revealed that despite availability of protective equipment, some HCW still attend to patients without protecting themselves despite being conscious of fact that they work in HIV specializes sites while other sill use unconventional means in the disposal of sharps and these are identified determinants to occupational exposure to HIV infection in these sites.

5.3 Recommendations

From the findings of this study, the researcher puts forward the following recommendations:

1. Immediate and sustained training and retraining of healthcare workers on infection prevention by the State Action Committee for AIDs (SACA), State AIDs and Syphilis Control Programme (SASCAP), and HIV Control Implementing Partners such as FH360 in Rivers State.
2. Occupational safety concerns of healthcare workers in privately owned PMTCT sites should be giving more attention by the Medical Services Department of the State Ministry of Health.
3. SASCP, SACA and FHI 360 should establish occupational exposure surveillance and reporting system at health facilities where it is not established and restructure existing one for better service delivery.
4. The State Ministry of Health through her relevant agencies should enforce the display of infection prevention guidelines and protocol at designated strategic positions in PMCTC sites within reach and visualization of HCWs.
5. Post exposure prophylaxis should be made available in all PMTCT with trained personnel to administer PEP at all times by the State HIV Control Programe in the State Ministry of Health.
6. Dedicated efforts at enforcing waste separation at PMTCT sites and regular supply of protective equipment for safety of healthcare workers in the State Ministry of health should be adopted.

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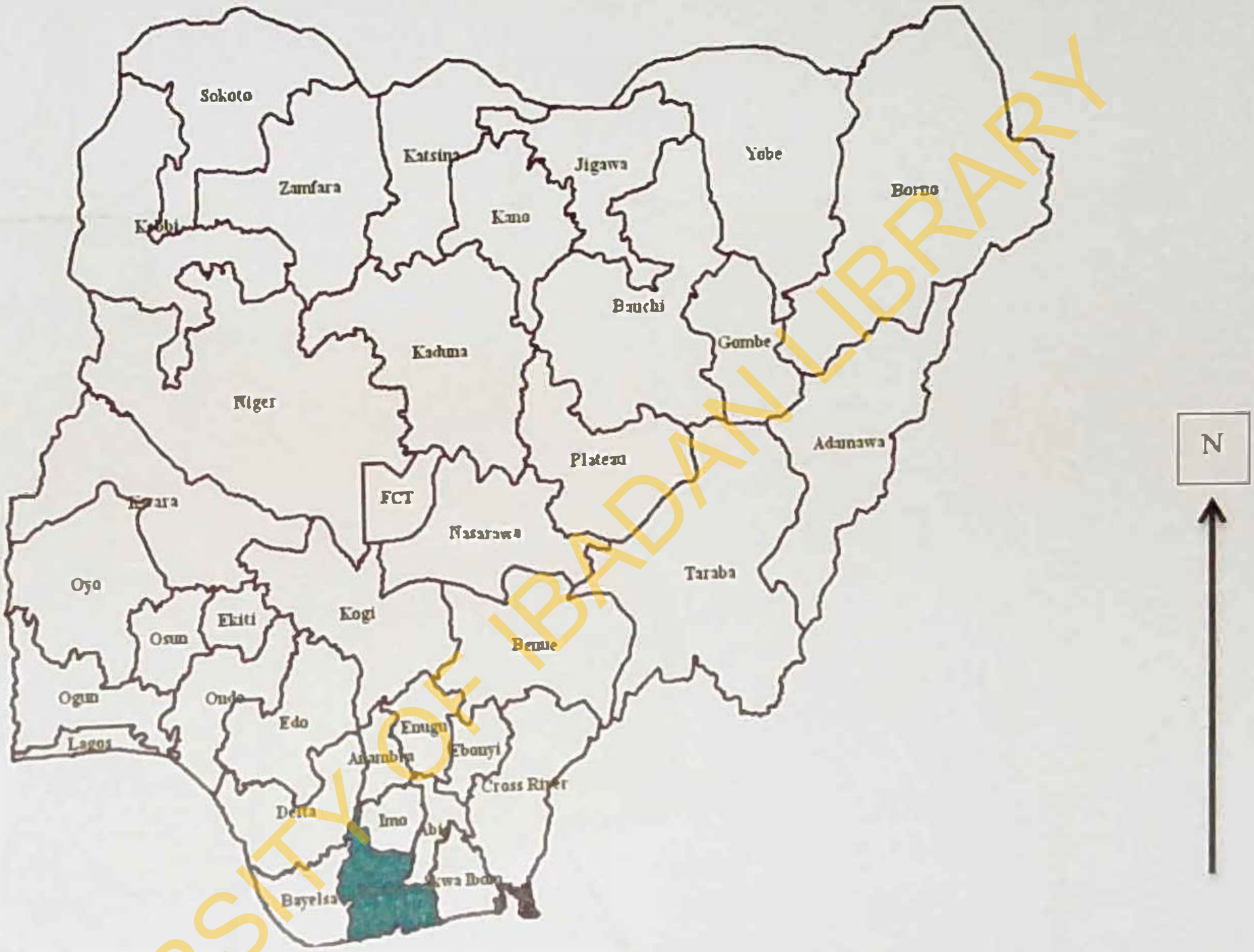
APPENDIX

APPENDIX 1: Map of Nigeria Highlighting Rivers State



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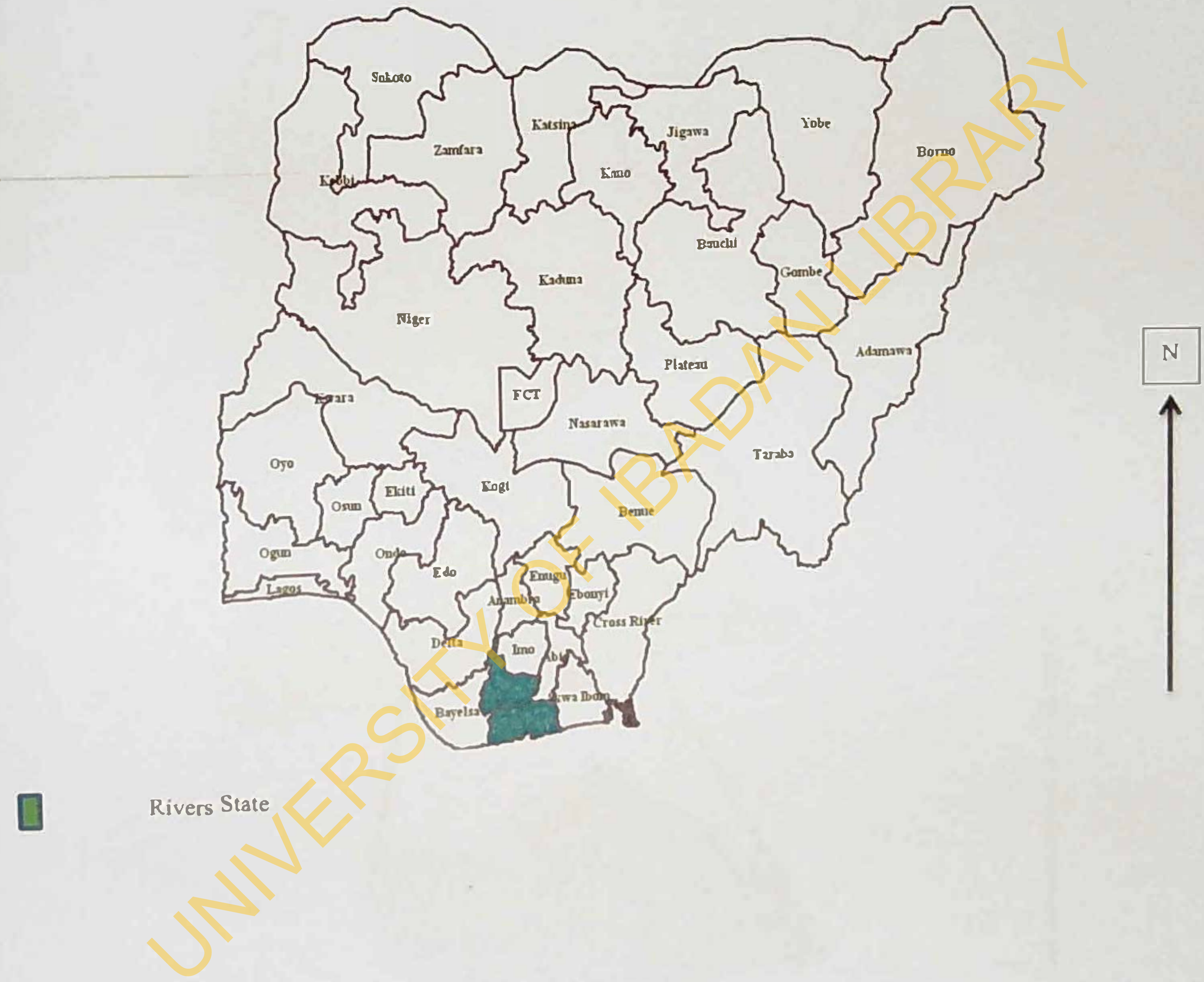
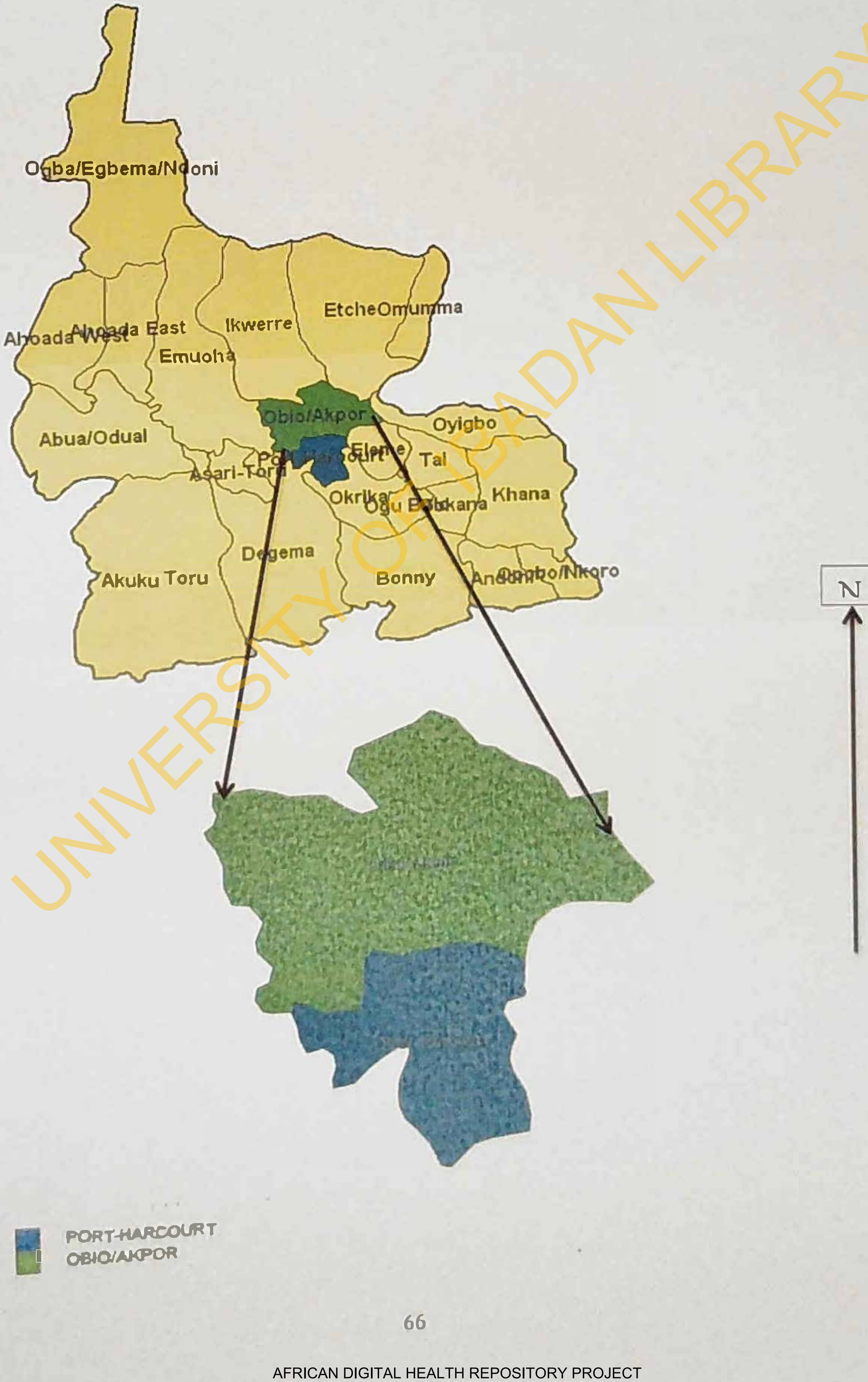
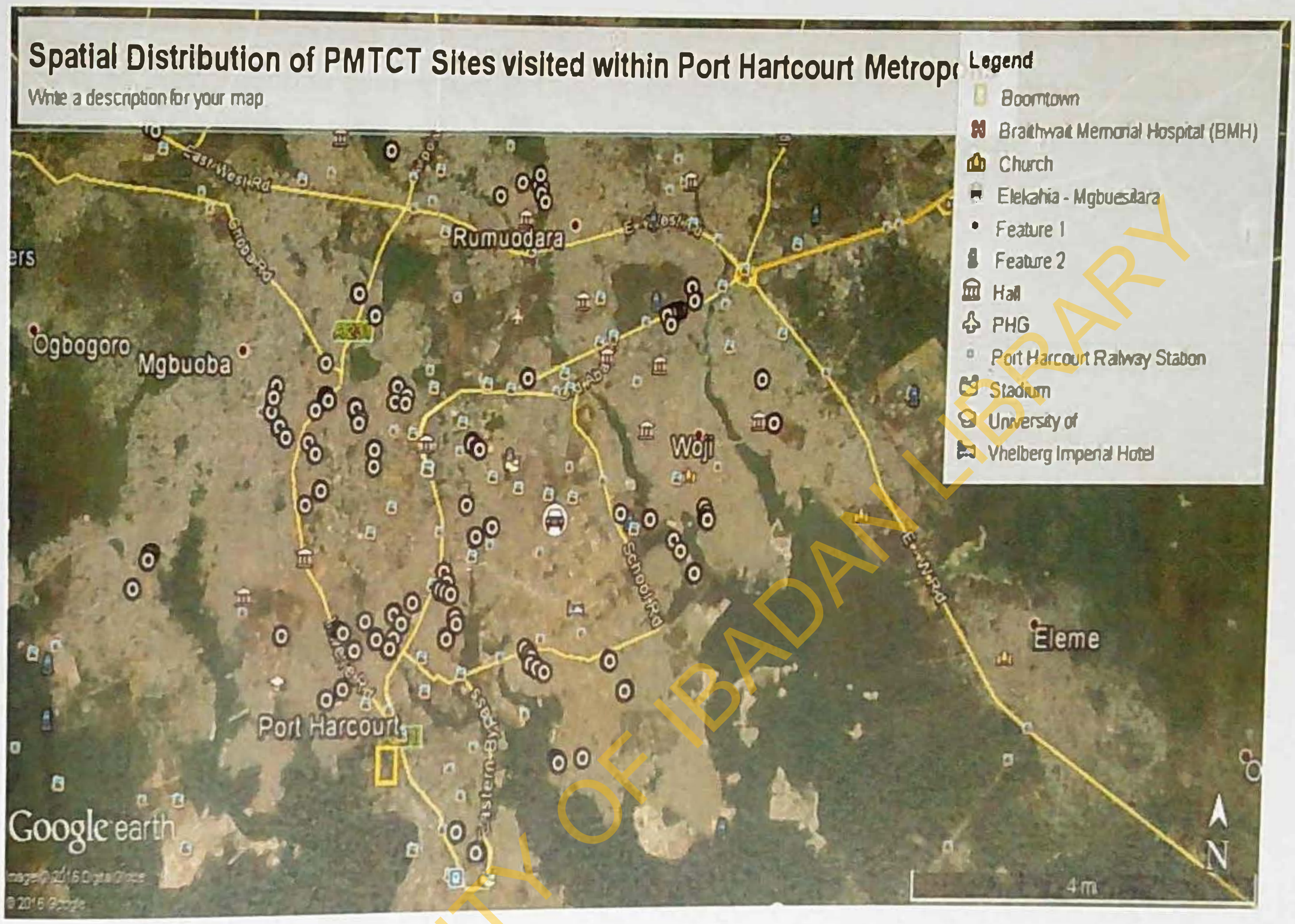


APPENDIX 2: Map of Rivers State Showing PH Metropolis



APPENDIX 3: Spatial Distribution of Study Sites



APPENDIX 4: Consent Form for Research

Title of Research Project: Prevalence and Determinants of Occupational Exposure to HIV Infection among Health Care Workers in PMTCT sites within Port Harcourt metropolis, April 2016

Principal Investigator: Dr Ndubuisi Akpuh

Introduction

Good day, dear respondent, I am an MPH resident of the University of Ibadan. I seek your ~~permission~~ to administer this questionnaire which was designed to assist me ~~determine~~ the **Prevalence and Determinants Of Occupational Exposure To HIV Infection Among Health Care Workers in PMTCT sites within Port Harcourt.**

What you should know about this study

You are being respectfully requested to participate in this study

This is a consent form that explains this research study and the part you are expected to perform

Kindly feel free to ask any question at any time about anything that is not clear to you

Ask any member of the study team of your choice to explain any word or information or concern in this form that you wish to be clarified.

Purpose of Research Project:

This study is aimed at determining factors responsible for occupational exposure among health care workers in PMTCT sites and how prevalent this occupational exposure is among a group of health care workers.

Procedures:

You are required to assist me achieve the purpose of this study by providing your sincere response to questions on this topic. This should take about 20 to 25 minutes of

your time. We look forward to your brief and clear contributions. We appreciate the few minutes you will spend in responding to these questions and sincerely assure you that all your response will be treated with utmost confidentiality.

Risk/Discomfort:

Some aspects of contained questions may be uncomfortable to you as it may seem to do with personal information or expression on certain aspect of your life, health and believe systems. There will be no needle pricks or bloodletting for any test to be done.

Anticipated Benefits:

1. Your participation in this study will improve knowledge base of occupational exposure of healthcare workers to HIV in the state.
2. It would also help direct interventions on occupational exposure to policy maker for the overall wellbeing of health workers which you are part of by revealing the determinant factors to occupational exposure.
3. Your participation is by no small way contributing to the fight on HIV infection

Voluntary Participation:

You have the right to change your mind or decide not to participate or rather withdraw your participation at any point in time during the course of this study. There will be no penalty or loss of benefit if you decide to quit the study. You are a volunteer. You are free to ask the research assistant or principal investigator any question you may have about this research study. During the study, we will tell you if we learn any new information that might affect whether you wish to continue to be in the study.

Who to call if I have questions, contributions or problems:

Call the principal investigator at Tel. 23480 3351 8839, if you have questions about the study or feel sick or get sick as a result of being in the study.

Call or contact Rivers state Ethical Committee at the State Hospital Management Board or Ministry of Health, if you think you have right as a research participant or if you think you have not been treated fairly.

The Committee contact information is Rivers State Ethical Committee Rivers State Hospital Management Board Port Harcourt or Ethical committee Ministry of Health Moscow Road Port Harcourt.

What does your signature on this consent form mean?

1. You have been informed about this study's purpose ,procedure ,possible benefits and risks
2. You have received a copy of this consent
3. You have been given the chance to ask any question at any time
4. You have voluntarily agreed to be in this study
5. You are free to stop being in this study at any time

Kindly endorse your wilful permission to administer this questionnaire on you

(1) Interviewee: (Name/Signature/Date) ----------

(2) Interviewer: (Name/Signature/Date)----------

(3) Witness to consent if participant is unable to read and write(Name/Signature/Date) ----------

Signed copy of this form must be:

Retained on a file by the principal investigator

Given to the subject .This consent document is NOT valid without the ethical Committee stamp of approval.

Signed copy of this form must be:

Retained on a file by the principal investigator

Given to the subject .This consent document is NOT valid without the ethical Committee stamp of approval.

APPENDIX 5: Questionnaire

Section A

Biodata

Interview date ----------

Questionnaire number ☐

Demographic Information

a. Age at last birthday _____

b. Sex: Male ☐ Female ☐

c. Occupational cadre: Doctor ☐ Nurse/midwife ☐ Laboratory scientist/technician ☐

Environmental worker ☐

d. Qualification : No education ☐ Primary ☐ Secondary ☐

Post-secondary Certificate ☐ University degree ☐

e. Years of experience: < 10 yrs. ☐ ≥10yrs ☐

f. Religion : Christianity ☐ Islam ☐ African tradition ☐

Others (specify) _____

g. Name of the health facility _____

h. Average work hour per week : < 40hrs ☐ ≥ 40hrs ☐

Section B

This section is on health worker perception towards risk of HIV acquisition; prevalent exposure type and Post Exposure Prophylaxis use.

9. Do you think HIV is a risk in the health worker environment? Yes ☐ No ☐ not sure ☐

10. Among HCW which cadre is more likely to contract HIV through occupational exposure?

(Check only one)

☐ Nurses

☐ Doctors

☐ Patient/ward attendants

☐ Lab scientist/technician

☐ Cleaners / refuse disposers

☐ None

11. Do you think you are at occupational risk of exposure to HIV in this facility?

Yes ☐ No ☐

b. Which amongst these are your reasons for yes above? (Check all that apply below)

i. Lack of protective equipment ☐

ii. Work load/pressured working condition ☐

iii. Lack of training on infection prevention ☐

iv. Carelessness on protecting oneself ☐

v. Lack of antiseptics ☐

vi. Lack of sterilizing unit ☐

vii. Poor work environment ☐

viii. others_____

12. Have you ever experienced occupational exposure (i.e. a needle prick or splash from patient) while performing your duties?

Yes ☐ No ☐

Section B

This section is on health worker perception towards risk of HIV acquisition; prevalent exposure type and Post Exposure Prophylaxis use.

9. Do you think HIV is a risk in the health worker environment? Yes ☐ No ☐ not sure ☐

10. Among HCW which cadre is more likely to contract HIV through occupational exposure?

(Check only one)

☐ Nurses

☐ Doctors

☐ Patient/ward attendants

☐ Lab scientist/technician

☐ Cleaners / refuse disposers

☐ None

11. Do you think you are at occupational risk of exposure to HIV in this facility?

Yes ☐ No ☐

b. Which amongst these are your reasons for yes above? (Check all that apply below)

i. Lack of protective equipment ☐

ii. Work load/pressured working condition ☐

iii. Lack of training on infection prevention ☐

iv. Carelessness on protecting oneself ☐

v. Lack of antiseptics ☐

vi. Lack of sterilizing unit ☐

vii. Poor work environment ☐

viii. others_____

12. Have you ever experienced occupational exposure (i.e. a needle prick or splash from patient) while performing your duties?

Yes ☐ No ☐

(If No kindly move to question 26 in section C)

(b) What type of exposure was it? Injury from sharps ☐ Body fluid splash ☐ both ☐

13. How many times in the past have you had occupational exposure?

☐ Once

☐ More than once

(b) When was the last time you experienced an occupational exposure?

☐ Less than 6 months

☐ Less than one year

☐ More than a year

14. What event led to your being occupationally exposed to HIV infection? Please. (Tick appropriately)

i. Recapping

ii. Suturing

iii. Emergency situation

iv. During sharps disposal

v. Sudden patient movement

vi. During injection

vii. Securing IV Line

viii. Others ----------

15. What circumstances enhanced your accidental occupational exposure to HIV infection?

(Kindly tick from options below)

(1) Emergency situation

(2) Carelessness on part on health worker

(3) Pressured with additional work

(4) Cover shift for colleague

(5) Assigned Night shift

(6) Public holiday

(7) Lack of assistant personnel at work

(If No kindly move to question 26 in section C)

(b) What type of exposure was it? Injury from sharps ☐ Body fluid splash ☐ both ☐

13. How many times in the past have you had occupational exposure?

☐ Once

☐ More than once

(b) When was the last time you experienced an occupational exposure?

☐ Less than 6 months

☐ Less than one year

☐ More than a year

14. What event led to your being occupationally exposed to HIV infection? Please. (Tick appropriately)

i. Recapping

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iii. Emergency situation

iv. During sharps disposal

v. Sudden patient movement

vi. During injection

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viii. Others ----------

15. What circumstances enhanced your accidental occupational exposure to HIV infection?

(Kindly tick from options below)

(1) Emergency situation

(2) Carelessness on part on health worker

(3) Pressured with additional work

(4) Cover shift for colleague

(5) Assigned Night shift

(6) Public holiday

(7) Lack of assistant personnel at work

(8) Psychological Stress

(9) Others ----------

16. Which of the measures listed below did you take when exposed?

a. Squeeze blood from the injury site

b. Washed with water/ normal saline

c. Washed with antiseptics

d. Applied pressure to stop bleeding

e. Allowed bleeding

f. Went for Voluntary Counselling and Testing (HCT)

g. Took post-exposure prophylaxis

h. Did nothing

17. Did you report the exposure? Yes ☐ No ☐

(b) If yes, to whom did you report? _____

18. Did you have an HIV test done? Yes ☐ No ☐

19. Did you start Post Exposure prophylaxis (PEP)? Yes ☐ No ☐

20. How soon after the injury did you start PEP?

☐ Within 72 hours

☐ After 72 hours

☐ Don't know

21. How many drugs make up the PEP regimen given to you?

☐ 1

☐ 2

☐ 3

☐ 4

(8) Psychological Stress

(9) Others ----------

16. Which of the measures listed below did you take when exposed?

a. Squeeze blood from the injury site

b. Washed with water/ normal saline

c. Washed with antiseptics

d. Applied pressure to stop bleeding

e. Allowed bleeding

f. Went for Voluntary Counselling and Testing (HCT)

g. Took post-exposure prophylaxis

h. Did nothing

17. Did you report the exposure? Yes ☐ No ☐

(b) If yes, to whom did you report? _____

18. Did you have an HIV test done? Yes ☐ No ☐

19. Did you start Post Exposure prophylaxis (PEP)? Yes ☐ No ☐

20. How soon after the injury did you start PEP?

☐ Within 72 hours

☐ After 72 hours

☐ Don't know

21. How many drugs make up the PEP regimen given to you?

☐ 1

☐ 2

☐ 3

☐ 4

22. Can you name the drugs (a) ..... (.b) .....(c).....

23. Did you complete PEP? Yes ☐ No ☐

24. If yes, did you have a follow up test? Yes ☐ No ☐

25. What are some of the reasons that make HCWs not report an occupational injury (needle stick/ fluid splashes)? (Check all that apply)

☐ If the patient does not look HIV positive

☐ Fear of an HIV test

☐ Fear of stigma

☐ Lack of compensation

☐ Does not know PEP

☐ Unavailability of PEP

☐ Lack of confidentiality of HIV results

☐ No structures for reporting injuries

SECTION C

This section is on the determinant factors to occupational risk exposure to HIV infection

A. Behavioural Factors

26. Do you practice the following as you work?

	Always	Sometimes	Never	Not Applicable
1. Wear double gloves				
2. Wash hands with soap after attending to patients				
3. Put on an apron				
4. Put on goggles in theatre				
5. Put on face mask				
6. Wipe hands with spirit/hand sanitizer				
7. Decontaminate instruments after use				
8. Use safety boxes				
9. Put on closed/covered shoes				
10. Wear heavy duty gloves				
11. Wear heavy duty aprons				

(b) Do you recap needle? Yes ☐ No ☐

27. Which amongst these affect your practice of using PPE while at work in this facility (check as apply below?)

- ☐ Discomfort while using
- ☐ Forgetfulness to wear
- ☐ Scarcity of PPE in facility
- ☐ When Patient does not look HIV positive
- ☐ Emergency situation
- ☐ Busy schedule
- ☐ Patient might get offended
- ☐ Nonuse by co-worker
- ☐ Not necessary to use
- ☐ Equipment unfit for work

Others ----------

B: Organizational Factors

28. Have you been trained on infection prevention and patient safety (IPPS)?

Yes ☐ No ☐

b. When last were you trained on infection prevention and patient safety if yes above?

Less than a year ☐ More than a year ☐

29. Are there IPPS guidelines/ protocol on display at workplace? (See before check on paper)

Present ☐

Absent ☐

30. Is Personal protective equipment (PPE) available for your use in this facility? Yes ☐ ☐

No

31. How regular is PPE supply to this facility? (Please check as apply)

a. Regular (always available) ☐ ☐

b. Irregular (Not available at all times for use)

32. What type of PPE is supplied?

(a) Hand glove

(b) Apron

(c) Boots

(d) Eye shield

(e) Others ----------

33. How many patients on the average do you have to attend to per day?

☐ 1 – 10

☐ 11 – 20

☐ 21 & above

34. Is PEP (Post Exposure Prophylaxis) available at this facility? Yes ☐ No ☐

35. Is there someone to administer PEP? Yes ☐ No ☐

36. At this facility, where do Health Care Workers access PEP?

☐ They do not access PEP

☐ They are referred to another facility

☐ Within the health facility

☐ Do not know

37 How do you dispose sharps in this facility?

(a) Needle destroyer

(b) Bury in a pit

(c) Discard into general waste container

(d) Sharp container

(e) Others ----------

38 Are there provisions for waste separation in this facility? Yes ☐ No ☐

39. Is there a reporting system for occupational exposure? Yes ☐ No ☐ Not aware

40. Do you think you need further training on infection prevention?

Yes ☐ No ☐

Thank You

APPENDIX 6: Sampled Health Facilities in Port Harcourt

List of sampled Private Facilities in Obio/Akpor LGA

S/n	Name	Address	Ward
1	Maryland health care	Opp. St. John catholic church ,off Rumuokurushi junction, PH	3
2.	Christ med. Clinic ltd.	18 Mike Amadi street, Rukpoku	4
3.	Holy child hospital	179 old refinery road, Elelenwo	5
4.	Elijohnson specialist hospital	3 Ahoada road Rumuibekwe	6
5	Pamo clinic & hospital	300 Aba/PH Road, Rumuomasi	8
6.	Spring hospital	458 Ikwerre road, Rumuepirikom	9
7.	Bennod clinic	Ada George road by Elioparanwo	9
8.	Calvary hospital	7 Haastrup street Orazi PH	11
9.	Bossom hospital	13b off Eligba Haastrup street	11
10	Ebony hospital	9 Ebony road Rumuola	13
11	Castle clinic	Off 42 Rumuola road after peoples club PH	13

Reserved sampled Private Facilities in Obio/Akpor LGA

S/n	Name	Address	Ward
1.	Kendex medical services	194 Elelenwo, old refinary road	5
2.	Woji cottage hospital	Near Alcon jetty road m Woji	6
3.	Alphonso hospital	191 old refinery road, Elelenwo	5
4.	Prime medical	4 Prime close, Rumuogba	6
5.	Rivon clinic	Plot c, Rumuogba estate, PH, Aba road	6
6.	First rivers hospital	By First bank Bus-stop along Aba road Rumuomasi	8
7.	Queens clinic	38 Rumuolumeni rd, Wimpey junction Rumuepirikom	9
8.	Harlyls clinics	By Orazi, near big tree off Rumuola road PH	11
9.	Sonabel medical centre	140 Owabie street Orazi	11
10.	El joedan hospital	Tour square road off local road Mgbouba	13
11.	Emmanuel hospital	Nkawa lare NTA Rumuokuta	13

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11.	Emmanuel hospital	Nkawa lare NTA Rumuokuta	13

List of Sampled Private Facilities in Port Harcourt City Local Government Area

S/n	Name	Address	Ward
1.	Meridian hospital	#21 Igbokwe street, D-line	1
2.	Morning star hospital	#19 Isiokpo street, D-line PH	1
3.	Rehoboth specialist hospital	#2 winner way by Afam street, D-line	1
4.	St. Patrick hospital	#3 eastern by pass Ogbunabali	2
5.	Starlin specialist hospital	#5 king Jaja street Drive, Churchill road	7
6.	Harry land hospital	UPE sandfield Borokiri, PH	7
7.	New mile one hospital	#15 Emenike street, by Ojoto B/stop mile 1 Diobu PH	10
8.	Chijiman specialist hospital	#10 Ovim street mile3 Diobu PH	10
9.	Victory clinic	#17 Uyo street, mile1 PH	11
10.	St. Martins hospital Rumuomasi	21 stadium road, PH	19
11.	Ultimate specialist hospital	67 Royal avenue off Odili road	20

Reserved Sampled Private Facilities in Port Harcourt City LGA

S/n	Name	Address	Ward
1.	Standard care clinic	#32 khana street, d-line	1
2.	Ashford & Patrice clinic ltd	#3b Manilla Pepple street,D-line	1
3.	Pearl clinic	#4 Anilla pepples street, D-line	1
4.	Atlantic Medical Centre	#76c Emekuku street, D-line P.H	2
5.	Olivet clinic	#18 Ede street Ogbbunabali	7
6.	Vita Medical Centre	#6 Oil of joy close Harold Wilson road Borokiri	
7.	Standard care maternity	#2 Captain Amangale street,P.H	7
8.	Seiyefa clinic	#9 Harold Wilson drive P.H	7
9.	Sovereign life Hospital	#96 Ojoto street, Diobu P.H	10
10.	Phonic Clinic	Mile 1 Diobu, PH	11

APPENDIX 7: Sampled Health Facilities in Port Harcourt

GOVERNMENT OF RIVERS STATE OF NIGERIA

Office Of The Permanent Secretary, Ministry of Health

13th April, 2016

Dr. Akpuh Ndubuisi
Epidemiological unit
Public health Department
Ministry of Health, PH

Sir,

FORWARDING OF LIST OF PUBLIC HEALTH FACILITIES IN PHALGA AND OBIO/AKPOR LOCAL GOVERNMENT AREAS

I am directed to forward herewith the list of Public Health facilities in PHALGA and OBIO/AKPOR Local Government Areas for your perusal and necessary action.

Please acknowledge receipt.

Yours faithfully,

S.C. Dikibo
Director (Statistics)
For: DPRS
For: Permanent Secretary

Block A, 2nd Floor, Rivers State Secretariat Complex, Port Harcourt Rivers State.
Tel: +234 84 234 389 +234 34 47992
www.riversstatemoh.gov.ng

APPENDIX 8: List of Health Facilities

PHALGA

SN	NAME OF HEALTH FACILITY	LOCATION	POLITICAL WARD
1	PRIMARY HEALTH CENTRE MGBUNDUKWU	MGBUNDUKWU	14
2	PRIMARY HEALTH CENTRE OZUBOKO	OZUBOKO	20
3	MODEL PRIMARY HEALTH CENTRE, OKURU-AMA	OKURU-AMA	20
4	PRIMARY HEALTH CENTRE AMADI-AMA	AMADI-AMA	20
5	PRIMARY HEALTH CENTRE ELEKAHIA	ELEKAHIA	19
6	MODEL PRIMARY HEALTH CENTRE, AZUABIE	AZUBIE	20
7	MINI HEALTH CENTRE	MILE III	10
8	PRIMARY HEALTH CENTRE BUNDU-AMA	BUNDU-AMA	5
9	EVERY WOMEN HEALTH CENTRE	MARIN-BASE	6
10	PRIMARY HEALTH CENTRE CHURCHILL	CHURCHILL	7
11	HEALTH OF THE SICK HOSPITAL	NKPOGU	19
12	CIVIL SERVANTS CLINIC	STATE SECRETARIAT	4
13	UST SECONDARY HEALTH CENTRE	UST CAMPUS	18
14	NAVAL MEDICAL CENTRE	BORIKIRI	7
15	MILITARY HOSPITAL	ABA ROAD	7
16	AIRFORCE MEDICAL CENTRE	ABA ROAD	7
17	POLICE HOSPITAL	BANK ROAD	19
18	GOVERNMENT HOUSE CLINIC	GOVERNMENT HOUSE	4
19	MODEL PRIMARY HEALTH CENTRE, POTT'S JOHNSON	POTT'S JOHNSON	5
20	PRIMARY HEALTH CENTRE OROGBUM	GARRISON	2
21	PRIMARY HEALTH CENTRE ABULOMA	ABULOMA	20
22	SICKBAY CLINIC	CITY COUNCIL	4
23	BRAITHWAITE MEMORIAL SPECIALIST HOSPITAL	HARLEY STREET	4
24	KELSEY HARRISON SPECIALIST HOSPITAL	EMENIKE STREET	14
25	DENTAL & MAXCILOFACIAL HOSPITAL	GARRISON	2

APPENDIX 8: List of Health Facilities

PHALGA

SN	NAME OF HEALTH FACILITY	LOCATION	POLITICAL WARD
1	PRIMARY HEALTH CENTRE MGBUNDUKWU	MGBUNDUKWU	14
2	PRIMARY HEALTH CENTRE OZUBOKO	OZUBOKO	20
3	MODEL PRIMARY HEALTH CENTRE, OKURU-AMA	OKURU-AMA	20
4	PRIMARY HEALTH CENTRE AMADI-AMA	AMADI-AMA	20
5	PRIMARY HEALTH CENTRE ELEKAHIA	ELEKAHIA	19
6	MODEL PRIMARY HEALTH CENTRE, AZUABIE	AZUBIE	20
7	MINI HEALTH CENTRE	MILE III	10
8	PRIMARY HEALTH CENTRE BUNDU-AMA	BUNDU-AMA	5
9	EVERY WOMEN HEALTH CENTRE	MARIN-BASE	6
10	PRIMARY HEALTH CENTRE CHURCHILL	CHURCHILL	7
11	HEALTH OF THE SICK HOSPITAL	NKPOGU	19
12	CIVIL SERVANTS CLINIC	STATE SECRETARIAT	4
13	UST SECONDARY HEALTH CENTRE	UST CAMPUS	18
14	NAVAL MEDICAL CENTRE	BORIKIRI	7
15	MILITARY HOSPITAL	ABA ROAD	7
16	AIRFORCE MEDICAL CENTRE	ABA ROAD	7
17	POLICE HOSPITAL	BANK ROAD	19
18	GOVERNMENT HOUSE CLINIC	GOVERNMENT HOUSE	4
19	MODEL PRIMARY HEALTH CENTRE, POTT'S JOHNSON	POTT'S JOHNSON	5
20	PRIMARY HEALTH CENTRE OROGBUM	GARRISON	2
21	PRIMARY HEALTH CENTRE ABULOMA	ABULOMA	20
22	SICKBAY CLINIC	CITY COUNCIL	4
23	BRAITHWAITE MEMORIAL SPECIALIST HOSPITAL	HARLEY STREET	4
24	KELSEY HARRISON SPECIALIST HOSPITAL	EMENIKE STREET	14
25	DENTAL & MAXCILOFACIAL HOSPITAL	GARRISON	2

APPENDIX 9: List of Health Facilities in Port Harcourt

OBIO/AKPOR LOCAL GOVERNMENT AREA

SN	NAME OF HEALTH FACILITY	LOCATION	POLITICAL WARD
1	MODEL PRIMARY HEALTH CENTRE, ELIOZU	ELIOZU	1
2	MODEL PRIMARY HEALTH CENTRE, IRIEBE	IRIEBE	2
3	MODEL PRIMARY HEALTH CENTRE,RUMUOKWURUSI	RUMUOKWURUSI	3
4	MODEL PRIMARY HEALTH CENTRE, RUMUODUMAYA	RUMUODOMAYA	4
5	PRIMARY HEALTH CENTRE,FSP ELELENWO	ELELENWO	5
6	MODEL PRIMARY HEALTH CENTRE, WOJI	WOJI	6
7	MODEL PRIMARY HEALTH CENTRE, RUMUEPRIKOM	RUMUEPRIKOM	9
8	CHST DEMONSTRATION CLINIC, RUMUEME	RUMUEME	10
9	MODEL PRIMARY HEALTH CENTRE, RUMUEME	RUMUEME	11
10	MODEL PRIMARY HEALTH CENTRE, RUMUIGBO	RUMUIGBO	12
11	MODEL PRIMARY HEALTH CENTRE, ENEKA	ENEKA	14
12	MODEL PRIMARY HEALTH CENTRE, RUKPOKU	RUKPOKU	14
13	ST. JUDES CATHOLIC PRIMARY HEALTH CENTRE	RUMUOKORO	7
14	LULU BRIGGS HEALTH CERTRE (UNIPORT MED CENTRE)	CHOBA	15
15	NEURO PSYCHIATRIC HOSPITAL	RUMUIGBO	12
16	PRIMARY HEALTH CENTRE, RUMUEKINI	RUMUEKINI	15
17	MODEL PRIMARY HEALTH CENTRE, OZUOBA	OZUOBA	16
18	MODEL PRIMARY HEALTH CENTRE, RUMUOLUMENI	RUMUOLUMENI	17
19	OBIO COTTAGE HOSPITAL	RUMUOBIOKANI	8
20	PRIMARY HEALTH CENTRE, RUMUOKWUTA	RUMUOKWUTA	13
21	IGNATIUS AJURU UNIVERSITY OF EDUCATION MED. CENTRE	RUMUOLUMENI	17

APPENDIX 10: Ethical Approval from Rivers State Ministry of Health

GOVERNMENT OF RIVERS STATE OF NIGERIA
Administrative Headquarters, Ministry of Health

MH/PRS/391/Vol. 2/382

31st May, 2016

The Director
Medical Services,
Ministry of Health,
State Secretariat
Port Harcourt.

Sir,

APPROVAL TO CONDUCT RESEARCH ON "PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTH CARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV (PMTCT) SITES WITHIN PORT HARCOURT METROPOLIS "

The bearer, Dr Akpuh Ndubuisi is a postgraduate student of Field Epidemiology Practice with the University of Ibadan, Oyo State Nigeria.

As part of the fulfilment for the award of a Master's Degree, he is required to conduct a research dissertation on "Prevalence and determinants of occupational exposure to HIV infection among health care workers in Prevention of Maternal To Child Transmission (PMTCT) of HIV sites within Port Harcourt metropolis".

To this end he is expected to administer questionnaires to consenting health care workers in selected health care facilities in the State. Attached is a copy of his research proposal.

Kindly accord him the necessary cooperation and support as no aspect of the research proposal was found to violate ethical considerations of Bio- medical research on human beings.

Please be assured of my highest regards.

Thank you.

Yours sincerely,

Dr. Opubo C. Idoniboyeobu *MBBS (Benin), PGDCH (Innsbruck), FWACP, MPH (Liverpool), JP*
Director/Head of Planning, Research and Statistics
Rivers State Ministry of Health
For: Permanent Secretary, Ministry of Health
Hon. Commissioner for Health

Cc:
1. Honourable Commissioner for Health
2. Permanent Secretary, Ministry of Health
3. Dr Akpuh Ndubuisi

Block A, 2nd Floor, Rivers State Secretariat Complex, Port Harcourt, Rivers State.
www. riverstatemoh.gov.ng

APPENDIX 11: Ethical approval from State Health Research Ethics Committee

GOVERNMENT OF RIVERS STATE OF NIGERIA

RIVERS STATE HEALTH RESEARCH ETHICS COMMITTEE

Rivers State Health REC
RSHMB Port Harcourt 16th
March, 2016.

AKPUH NDUBUISI
(MBBCH, CALABAR
Department Of Epidemiology and
Biostatistics Faculty of Public Health
University of Ibadan.

ETHICAL APPROVAL

RESEARCH PROPOSAL TITLED "PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTHCARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV (PMTCT) SITE WITHIN PORT HARCOURT METROPOLIS."

We refer to your letter dated 12th November, 2015 requesting for Ethical Approval of your Research Project titled "PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTHCARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV (PMTCT) SITE WITHIN PORT HARCOURT METROPOLIS."

After a critical appraisal of your proposal by the Rivers State Research Ethics Committee, approval is hereby given to you to commence your study.

Note the following

1. The study can be started after it is approved by examining body.
2. The Committee reserves the right to withdraw this approval if at any time during the conduct of the study you infringe on the ethical regulations of the Committee or the ethical rights of your study subject.

Dr. Mrs. U. Igbokwe
Chairman
Rivers State Health Research Ethics Committee

RIVERS STATE HOSPITALS MANAGEMENT BOARD
26 Okoroma Street, P.M.B. 6083, Port Harcourt, Nigeria
Tel.: 084-230828 E-mail: rshmbph@yahoo.com

APPENDIX 12: Authorization to Carry out Research by RSPHCMB

GOVERNMENT OF RIVERS STATE OF NIGERIA
PRIMARY HEALTH CARE MANAGEMENT BOARD

19th May, 2016.

Dr. Akpuh Ndubuisi
Nigerian Field Epidemiology & Laboratory Training Programme,
Abuja

APPLICATION TO CARRY OUT A RESEARCH STUDY

With reference to your letter on the above subject matter dated May 17th, 2016 we wish to convey the approval of the Rivers State Primary Health Care Management Board (RSPHCMB) permitting you to carry out the proposed study on **"PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTHCARE WORKERS IN PMTCT SITES WITHIN PORT HARCOURT METROPOLIS, RIVERS STATE".**

This approval permits you to administer questionnaires to health care workers in the following Primary Health Centres: MPHCs Eliozu, Eneke, Rumuepirikom, Rumuigbo, Rumuodomaya, Rumuolumeni, Woji, PHCs Elelenwo, Iriebe, Rumuekini and College of Health Technology Health Centre in Obio/Akpor LGA and MPHCs Abuloma, Amadi-Ama, Azuabie, Churchill, Elekahia, Mgbundukwu, Ozuboko-Ama and FSP Oregbum in Port Harcourt LGA. The approval is for data collection over a period of one week from the date on this letter.

Letters to this effect will be sent to the Medical Officers of Health in these LGAs and the Medical Officers-in-charge of the health centres. A high ethical standard should be maintained during and after the study with particular regard to patient/client rights and confidentiality.

Furthermore, you are required to furnish the Director, Planning Research and Statistics of the RSPHCMB with your findings at the end of the research. Failure to comply with this feedback policy of the Rivers State Primary Health Care Management Board at the end of the study may adversely affect other researchers from your institution in future.

We wish you success in this project.

DR. CLEMENT EDET
DIRECTOR PRS
FOR: EXECUTIVE SECRETARY

Administrative Headquarters, Plot 27/29 Dr. Sam Wobo Street, Off Sani Abacha Road, GRA Phase 3, Port Harcourt, Rivers State.
Tel: +234 806 522 7232, +234 806 522 7112 www.rsphcmb.org.ng

APPENDIX 12: Approval for research

GOVERNMENT OF RIVERS STATE OF NIGERIA
Administrative Headquarters, Ministry of Health

MH/PRS/391/Vol. 2/383

31st May, 2016

The Permanent Secretary
Rivers State Primary Health Care Management Board
Administrative Headquarters
Plot 27/ 29 Sam Wobo Street
Off Sani Abacha Road
GRA Phase 3
Port Harcourt.

Sir,

APPROVAL TO CONDUCT RESEARCH ON "PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTH CARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV (PMTCT) SITES WITHIN PORT HARCOURT METROPOLIS"

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To this end he is expected to administer questionnaires to consenting health care workers in selected health care facilities in the State. Attached is a copy of his research proposal.

Kindly accord him the necessary cooperation and support as no aspect of the research proposal was found to violate ethical considerations of Bio- medical research on human beings.

Please be assured of my highest regards

Thank you

Yours sincerely,

Dr. Opubo C. Idoniboycobu *MBBS (Benin), PGDCH (Innsbruck), FWACP, MPH (Liverpool), JP*
Director/Head of Planning, Research and Statistics
Rivers State Ministry of Health
For: Permanent Secretary, Ministry of Health
Hon. Commissioner for Health

Cc:
1. Honourable Commissioner for Health
2. Permanent Secretary, Ministry of Health
3. Dr Akpuh Ndubuisi

APPENDIX 12: Approval for research

GOVERNMENT OF RIVERS STATE OF NIGERIA
Administrative Headquarters, Ministry of Health

MH/PRS/391/Vol. 2/383

31st May, 2016

The Permanent Secretary
Rivers State Primary Health Care Management Board
Administrative Headquarters
Plot 27/ 29 Sam Wobo Street
Off Sani Abacha Road
GRA Phase 3
Port Harcourt.

Sir,

APPROVAL TO CONDUCT RESEARCH ON "PREVALENCE AND DETERMINANTS OF OCCUPATIONAL EXPOSURE TO HIV INFECTION AMONG HEALTH CARE WORKERS IN PREVENTION OF MATERNAL TO CHILD TRANSMISSION OF HIV (PMTCT) SITES WITHIN PORT HARCOURT METROPOLIS "

The bearer, Dr Akpuh Ndubuisi is a postgraduate student of Field Epidemiology Practice with the University of Ibadan, Oyo State Nigeria.

As part of the fulfilment for the award of a Master's Degree, he is required to conduct a research dissertation on *"Prevalence and determinants of occupational exposure to HIV infection among health care workers in Prevention of Maternal To Child Transmission (PMTCT) of HIV sites within Port Harcourt metropolis".*

To this end he is expected to administer questionnaires to consenting health care workers in selected health care facilities in the State. Attached is a copy of his research proposal.

Kindly accord him the necessary cooperation and support as no aspect of the research proposal was found to violate ethical considerations of Bio- medical research on human beings.

Please be assured of my highest regards.

Thank you.

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For: Permanent Secretary, Ministry of Health
Hon. Commissioner for Health

Cc:
1. Honourable Commissioner for Health
2. Permanent Secretary, Ministry of Health
3. Dr Akpuh Ndubuisi

Block A, 2nd Floor, Rivers State Secretariat Complex, Port Harcourt, Rivers State.
www. riverstatemoh.gov.ng