Occupational Exposure to HIV among Health Care Workers in PMTCT sites in Port Harcourt, Nigeria, 2017

CURRENT STATUS: UNDER REVIEW

Akpuh Ndubuisi drakpuh@gmail.com
Estado Peruano Ministerio de Salud
Corresponding Author
ORCiD: 0000-0003-4336-0711

Adebowale Ayo
University of Ibadan

Ajayi IkeOluwapo

Idris Suleiman H

Mahmood Dalhat

Elizabeth Adedire

DOI: 10.21203/rs.2.12268/v1

SUBJECT AREAS
Health Economics & Outcomes Research Health Policy

KEYWORDS
Occupational exposure, HIV, health care workers, Private facility, Public facility, PMTCT, Port Harcourt, Rivers State, Nigeria
Abstract

Background

Rivers State is one of the states with high HIV prevalence rate in Nigeria. Occupational exposure to pathogen infecting blood and or body fluids of HIV/AIDS patients is attributable to HIV infections among healthcare workers. We identified the determinants of occupational exposures to HIV among healthcare workers in PMTCT sites within Port Harcourt metropolis in Rivers State.

Methods

A descriptive cross-sectional study was conducted and multi-stage sampling technique was used to select 341 healthcare providers from 22 public and 22 private health facilities in PMTCT sites in the Port Harcourt metropolis. Data were analysed using descriptive statistics, Chi-square and logistic regression models (p-value = 0.05).

Results

Respondents’ mean age was 35.9±SD8.4 years, 270 (80.1%) and 171(50.7%) were females and from public health facilities respectively. Prevalence of occupational exposure of healthcare workers to HIV in the past 12 months was 153 (45.0%) and 96 (63.3%) experienced such exposure more than once. Contact with potentially infectious body fluid accounted for the largest proportion 51 (33.3%) followed by needle stick prick 49 (32.6%). About 189 (56.1%) had safety information at their disposal that serves as a reminder on safety precautions. The likelihood of occupational exposure was significantly higher among doctors (AOR=2.22, 95% C. I=1.16-4.25,) but lower among Environmental health workers (AOR=0.10, 95% C. I=0.02-0.46,) than Nurses/Midwives when other factors were included in the model.

Conclusion

Occupational exposure to blood and body fluids remains a frequent occurrence among
healthcare workers in PMTCT sites in the study area. Adherence to universal precaution strategies should target all health care workers.

Background

HIV/AIDS is one of the infectious diseases that threaten human survival world over [1]. Nigeria accounts for the 9.0% of the global HIV/AIDS burden and the national prevalence rate of 3.2% with 3.1 million people living with the disease [2]. Nigeria has the 2nd largest number of people living with HIV/AIDS (PLHA) in Africa continent (UNAIDS Fact Sheet, 2017), with a huge impact on the health system [3]. Report of HIV research in Nigeria showed that Rivers State has the highest HIV prevalence (15.2%) among the states in the country (National AIDS Reproductive Health survey, 2013) but latest National HIV/AIDS indicator survey places her in third position in prevalence amongst 36 states and federal capital territory (Federal Ministry of Health, 2019). Health care workers are exposed to infection-causing organisms, including HIV as a result of caring for patients in the health care settings which often place them at risk of infection [4].

Body fluids are encountered during different medical intervention in the healthcare setting and over the years; healthcare workers have become infected with HIV [5] through a percutaneous injury (needle stick or cut with a sharp object), contact of mucous membrane, or contact of skin (especially when the exposed skin is chapped, abridged, or afflicted with dermatitis [6][7][8][9]. It is known that adherence to safety procedures in developing countries is challenged by the unavailability of protective equipment and or health worker’s refusal to use safety equipment were available [10]. There is a global emphasis on achieving universal access to treatment as a strategy for addressing HIV/AIDS without addressing disproportionate health worker to patient ratio. This implies an increase in the turnover of patients seeking care and further increase the risk of health care workers to occupational exposure and infection to HIV by exhaustion and fatigue.
This study focuses on health care workers at higher risk of occupational infection compared to other health care workers with lower risk of occupational HIV infection [11]. It also focuses on specialized care centre as Prevention of Maternal to Child Transmission of HIV (PMTCT) sites in public and private setting. This is because PMTCT sites are designated sites for HIV patients; and the care they receive during labour and child delivery almost certainly entail revealing body fluids which can infect a health worker. There is a paucity of information on occupational exposure in private health care setting and in HIV designated care centres in the available literature.

The objectives of this study are; to determine the prevalence of occupational exposure to HIV infection among health careworkers in PMTCT sites; assess risk perception to occupational exposure, the practice of standard precaution procedure and use of personal protective equipment by health careworkers in PMCT sites. Other objectives are to determine the availability of safety protocol/regulation or standard on HIV prevention in PMTCT sites and identify factors associated with the risk of occupational exposure to HIV infection among health careworkers in PMTCT sites [4]. The information and recommendation from this study would draw attention to the plight of health careworkers and strengthen infection prevention activities.

Methods

Study sites: This study was carried out in Rivers State, Nigeria. Rivers State has PMTCT designated public and private health facilities. The public healthcare facilities are model primary healthcare facilities that are evenly distributed within the metropolis. The private health facilities offer comprehensive healthcare services to clients. All study sites are reputed for good volume of client turn out and had at least a representative of the healthcare worker of interest.

Study design: We conducted a cross-sectional health facility-based study.
**Study population:** The study population was made up of health care workers whose daily activities require caring for HIV infected patients such as doctors, nurses/midwives, laboratory scientist/technicians and environmental workers.

**Inclusion criteria:** Health care workers in the selected health facility who were included in this study are doctors, nurses and midwives, laboratory scientist or technicians and environmental workers who were on duty and present at the time of visit; and gave their consent.

**Exclusion criteria:** Trainee healthcare workers, health care workers that had assumed administrative responsibility and those who are less than 6 months into posting at present workplace were excluded from the study.

**Sample size Calculation**

The sample size of 341 was calculated using the formula,

\[ n = \frac{Z_{\alpha/2}^2 \times p \times q}{d^2} \]

Where, 

- \( n \) = the minimum sample size
- \( Z_{\alpha} \) = 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 [12]
- \( q = 1 - p = 0.72 \)

10% non-response rate brings \( n = 341 \)

**Sampling Technique** We used multiple stage sampling technique to select the study subjects.

**Stage 1:** Health Facility Selection: All 22 public facilities within the study area designated PMTCT sites were sampled and an additional 22 of identified 34 private health facilities were selected by simple random sampling.
Stage 2: Selection of health care 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 Participants At the facility, one health care worker was selected by balloting to represent each professional cadre of health workers from the study population. The remaining two health workers needed to make six required health care workers were selected randomly from the four professional cadres of healthcare workers in the facility. Where a facility had six health care workers, all were studied and where less the remaining is made up from another facility.

Pre-testing of data collection tool
Pre-testing of the questionnaire was conducted on 30 health careworkers working in five health institutions that were not selected for the study before the actual data collection. Modification of logical sequence, simplicity, and clarity of questionnaire was done using the findings at the pre-test.

Data collection
Data was collected using semi-structured interviewer-administered questionnaire. The questionnaire had three sections. Section A: socio-demographic characteristics of health care workers such as age, sex and occupation. Section B: Occupational risk exposure to HIV, and Section C: Determinant factors to occupational risk exposure to HIV infection.

The questionnaire was adopted from previous similar published works [1][13].

Statistical analysis
Data were analysed using Epi info 7 and SPSS statistical software. 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 healthcare workers at 0.05 levels of significance.

Ethical consideration

Approvals for the study were sought and obtained from the Scientific and Ethical Committee of Rivers State Ministry of Health and Ethical Committee of the Rivers State Hospital Management Board. Before the questionnaires were administered, informed consent was obtained from each participant after a careful explanation to them of their ethical rights. Participants understood their rights concerning willful participation in the study and the right to wilfully withdraw at any point in the interview irrespective of previous consent. We studied participants according to the guidelines for research stated by Federal Ministry of Health in Nigeria.

Results

A total of 337 health care providers working at PMTCT sites 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. Sixty-three (18.7%) respondents were doctors, 124 (36.8%) nurses, 52 (15.4%) laboratory scientists or technicians, and 98 (29.1%) were environmental health workers. Most (270, 80.1%) of the respondents were females and were predominantly Christians (336, 99.7%).

The majority (243, 72.1%) of the respondents had completed tertiary education. One-third (125, 37.1%) had worked for 10 years or more, and 246 (73%) work for an average of 40 hours or more. Seventy-eight (23.1%) of the respondents were between the ages of 20–29 years, 156 (46.3%) were between the ages of 30–39 years, 75 (22.3%) were between the ages of 40–49 years, 24 (7.1%) were between the ages of 50–59 years and 4(1.2%) were 60 years old and above. The mean age was 35.9±8.4 years.
The data also depict that the overall prevalence of occupational exposure to HIV infection among the studied health care providers in PMTCT sites in Rivers State was 45.4% (Table 2). Among health care workers in the public health facilities, the prevalence of occupational exposure to HIV infection was 40.9% compared to 50% reported by those who work in the private health facilities.

From the respondents, the prevalence of occupational exposure to HIV infection was as high as 69.8% among doctors and as low as 20.4% among environmental health workers. Higher prevalence was found among males (53.7%) than females (43.3%).

The prevalence increased with the level of education from 23.8% among those with at most secondary education to 53.5% among those with higher education. It was lower among those with less than 10 years working experience (42%) compared to those with at least 10 years (51.2%). In terms of the number of working hours in a week, the prevalence of occupational exposure was higher for health care workers who worked less than 40 hours (50.5%) compared to those who worked 40 hours or more (43.5%) in a week.

With regards to the age of each respondent, the prevalence was 154.7% among healthcare workers aged at least 40 years which is 42.3% for those between the age of 30-39 years and 41.0% for those between the ages of 20-29 years.

In Figure 1, eleven safety and infection prevention parameters common among almost all categories of health workers were used to access practices of standard precaution procedures among the cadre of study participants. Firstly, on the use of hand gloves, 123 (36.5%) of the health care workers always wear hand gloves in the course of their duty, while 185 (54.9) wear hand gloves sometimes and 29 (8.6%) never wear hand gloves. Secondly, more than four-fifths (90.5%) of the health care workers said they wash their
hands always, 22(6.5%) sometimes and 10(3.0%) never washes hands while on duty. Among the interviewed, 224(66.5%) wiped hands with spirit or hand sanitizers always while 94(27.9%) sometimes and 19(5.6) never did such. The face mask was worn always by 117(34.7%) and 85(25.2%) never did.

Thirdly, in the decontamination of instruments to prevent infection to other health users, 279(82.8%) always did decontaminate instruments they used, while 13(3.9) decontaminates sometimes and 45(13.3%) of the study participants never decontaminated instruments immediately after use while

Finally, the use of safety boxes is the appropriate practice in the health care environment and health care workers are expected to adhere to its use always. Among the studied participants, 278(82.5) used safety boxes in the disposal of health waste always while 32(9.5) never used the safety box. Only 168 (49.0%), 29(8.6%) and 23 (6.8%) always wear; closed covered shoes, heavy duty gloves and heavy-duty aprons respectively.

[Figure 1 is here]

Figure 2 illustrates the disposal of sharp equipment in the facilities. Among the study participants, 237(70.3%) of respondents dispose sharp equipment into containers set aside for sharps disposal. For some sharps like needles, 48 (14.2%) destroy the needle in a needle destroyer, 25(7.4%) bury them in a health facility waste pit and 3.9% discard them into general waste containers. Only 4.2% dispose of sharps by other means that were not mentioned.

[Figure 2 is here]

In Table 3, the data show that the main predictors of occupational exposure to HIV were career cadre. Education and facility type which were not significantly related to occupational exposure. The likelihood of occupational exposure was significantly higher among doctors (AOR = 2.2, 95% C.I = 1.2–4.3, p<0.05) but lower among environmental
health workers (AOR = 0.10, 95% C.I = 0.02-0.46, p<0.01) than nurses/midwives. Also, the risk of occupational exposure to HIV was 0.71(C.I = 0.44-1.12, p>0.05) times less among health workers who work less than 40 hours a week than those who work for at least 40 hours but this was not statistically significant.

[Table 3 is here]

Discussion

Our findings indicate that about half of the health care workers had been exposed to HIV at their duty posts at one time or the other in the past one year prior this study. These findings are consistent and similar to the Nigerian, Ugandan and Ethiopian studies on occupational exposures of health care workers to HIV infection conducted in 2014, 2015, 2010 and 2012 respectively [14][15][8][16] Our finding was higher than the one obtained from similar study conducted in Northern Nigeria in 2013[3]. This difference in prevalence of HIV observed in previous studies and our present study could be as a result of the difference in the study setting, study design and other methodological techniques. The differential in the level of training received by the health care workers in different PMTCT could also contribute to the variation.

It was also found that the prevalence of occupational exposure to HIV infection was higher among health care worker in private owned health facilities than their counterparts in the public health facilities. Higher prevalence observed among HCWs in private health facilities might be due to the fact that private health facilities are profit-oriented. High shortage of manpower and possible extended work hours per week in order to maximize profit, especially in the phase of prevailing economic challenges in Nigeria might be responsible for the exposure and increase in the prevalence of HIV to HCWs in private facilities. This implies that the private health care facilities may not be living up to the expectations of their health care workers or adhering to health and safety regulations in
terms of providing protective tools and training on standard infection prevention techniques provisions. On the other hand, the public health facilities attract supports and partnership from international agencies and organisations compared with private health facilities from local knowledge. This involves supply of personal protective equipment as well and training of personnel.

The risk 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 muco-cutaneous exposure. Contact with potentially infectious body fluid was found to be the commonest route of exposure to HIV infection in this study both in private and in public health care setting. This is the expected of the outcome of studies conducted in different locations as individuals’ knowledge on infection prevention may differ. While some HCWs may not see needle stick prick as a serious means of infection transmission, others could ascribe more importance to it and this understanding guides them in their practice and adherence to safety measures. Other, important factors that could influence the experience of health care workers occupational exposure to HIV infection were identified as lack of training on infection prevention and patient safety, unavailability and/or irregular supply of personal protective equipment, and inadequate post-exposure prophylaxis and shortages of personnel to administer post-exposure prophylaxis. The existence of these factors that expose healthcare worker to HIV infection in PMTCT setting, irrespective of their magnitude are of high significance. This is because the PMTCT site is a specialized site where HCWs are in regular direct contact with HIV patients and at such are at higher risk of contracting HIV compared to health workers in other segments of health care facilities whether private or public.

In addition, we found 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 the similar study reported same in Mongolia [21]. This is because fatigue and exhaustion could lead to lack of concentration and can further predispose the HCW to occupational exposure. Lack of concentration will readily lead to negligence of infection prevention procedures and also predispose the HCW to occupational exposure to HIV virus. This has also been reported in similar studies from other developing countries where disparity in HCWs to patients that need medical attention ratio exist.() Some of the facilities studied had no established system for reporting and prevention of occupational exposures. This was similar to the situation reported in areas of comparable resource setting [17]. The findings were that a quarter of the participants received no training on prevention of occupational exposure and that almost all the participants required training on infection prevention and patient safety. These findings were health care workers are poorly trained on infection prevention are comparable to outcomes from similar studies in Tanzania in 2015 and Nigeria in 2007 and 2014 [18][19][20]. Display of prevention and patient safety signs in health facilities are critical to attitudes of HCWs to infection prevention and patient safety practices. Our research indicates that slightly about fifty-percent of the studied PMTCT sites had guidelines for infection prevention and patient safety readily on display. This situation is common practice among health facilities in developing countries as reported in a similar study previously conducted in Uganda [4][17]. The important predictors of occupational exposure found in this study were; occupational cadre of health care worker and length of working hours. Doctors and nurses were found at higher risk of exposure than laboratory scientists. High risk found among doctors could be attributed to the fact that they are particularly involved in carrying out invasive procedures, doing veno-puncture and repair episiotomy. They also oversee the activities
of other cadre of health careworkers and are not limited in the level of patient management as reported in England.

Conclusion

The prevalence of occupational exposure to HIV infection among HCWs in PMTCT sites within Port Harcourt Metropolis is high. Occupational exposure of health care workers to HIV infection is predicated upon the professional cadre of the health worker and average weekly working hours. In addition, the HCW knowledge and adherence to the practice of infection prevention and patient safety is low. Also, despite the availability of protective equipment, some HCW still attend to patients without protecting themselves while others still use unconventional means at the disposal of sharps equipment. This implies that health workers are at risk of HIV infection. Therefore, immediate training of HCW on HIV infection prevention is recommended especially in privately owned PMTCT health facility sites. There is also need to enforce the display of infection prevention guidelines and protocol in the PMCTC sites within the constant reach and visualization of HCWs. All these are necessary to ensure the safety and protection of HCW.

Declarations

Acknowledgements

This research was supported by funding from the CDC. The authors would like to appreciate Dr Dairo. We would especially acknowledge the NFELTP facilitators and host of others too numerous to mention for their intellectual contributions to the completion of this research.

Competing Interests

The authors declare no competing interest

Authors’contributions
Ajayi, I and N. Akpuh made substantial contributions to the design of the study. N Akpuh was the principal investigator, designed data collection tool, collected data, analysed and interpreted data. A. Adebowale assisted with data analysis. I. Ajayi, A Adebowale, I. Suleiman, D. Mahmood and E. Adedire revised article critically and made several important intellectual contributions. All authors’ have read and approved the manuscript.

Tables and figures

Table 1: Demographic characteristics and Prevalence of Occupational Exposure to HIV Infection among Health care Workers in PMTCT Sites Rivers State, April 2016

Table 2: Infection Prevention and Patient Safety Standards at PMTCT sites Port Harcourt Nigeria–2016

Table 3: Factors found to be significantly associated with occupational exposure among health care workers in PMTCT sites Port Harcourt, South-south Nigeria. April 2016

Figure 1: Practice of infection prevention procedures among health care workers in PMTCT sites

Figure 2: Sharps disposal in PMTCT sites, PH Metropolis, Rivers State, 2016

References

1. Tesfay FA, Habtewold TD. Assessment of Prevalence and Determinants of Occupational Exposure to HIV Infection among Healthcare Workers in Selected Health Institutions in Debre Berhan Town, North Shoa Zone, Amhara Region, Ethiopia, Hindawi Publishing Corp. Aids Research & Treatment 2014.

2. Awofala AA, Ogundele OE. HIV epidemiology in Nigeria. Saudi J Biol Sci. 2015. doi:10.1016/j.sjbs.2016.03.006.

3. Amoran OE. Occupational Exposure, Risk Perception and Access to Prophylaxis for HIV/AIDS Infection among Health Care Workers in Northern Nigeria. Br J Med Med Res.
4. Gebresilassie A, Kumei A, Yemane D. Community Medicine & Health Education Standard Precautions Practice among Health Care Workers in Public Health Facilities of Mekelle Special Zone, Northern Ethiopia. J Community Med Health Educ 2014;4(3). doi:10.4172/2161–0711.1000286.

5. Yimechew BZ, Tiruneh G, Ejigu T. Occupational Exposures to Blood and Body Fluids (BBFS) among Health Care Workers and Medical Students in University of Gondar Hospital, Northwest of Ethiopia. Glob J Med Res. 2013;13(3):17–23.

6. Beyera GK, Beyen TK. Epidemiology of exposure to HIV / AIDS risky conditions in healthcare settings: the case of health facilities in Gondar City, North West Ethiopia. BMC Public Health, 2014;1–8.

7. Beyene T, Tadesse S. Predictors of occupational exposure to HIV infection among healthcare workers in southern Ethiopia. IJICv10i3.020,14.

8. Reda A a., Fisseha S, Mengistie B, Vandeweerd JM. Standard precautions: Occupational exposure and behavior of health care workers in Ethiopia. PLoS One. 2010;5(12):1–6.

9. Mashoto KO, Mubyazi GM, Makundi E, Mohamed H, Malebo HM. Estimated risk of HIV acquisition and practice for preventing occupational exposure: a study of healthcare workers at Tumbi and Dodoma Hospitals, Tanzania. BMC Health Serv Res. 2013;13(1):1.

10. Gumodoka B, Favot I, Berege ZA, Dolmans WM. Occupational exposure to the risk of HIV infection among health care workers in Mwanza Region, United Republic of Tanzania. Bull World Health Organ. 1997;75:133–140.

11. Alemie GA. Exploration of healthcare workers’ perceptions on occupational risk of HIV transmission at the University of Gondar Hospital, Northwest Ethiopia. BMC Res Notes. 2012;5(1):704.

12. Odongkara BM, Mulongo G, Mwetwale C, Akasiima A, Muchunguzi H V, Mukasa S, et al.
Prevalence of occupational exposure to HIV among health workers in northern Uganda. Int J Risk Saf Med. 2012;24:103-113.

13. Bashorun A, Nguku P, Kawu I, Ngige E, Ogundiran A, Sabitu K, et al. A description of HIV prevalence trends in Nigeria from 2001 to 2010: what is the progress, where is the problem? Pan Afr Med J. 2014;18 Suppl 1(Supp 1):3.

14. Ogoina D, Pondei K, Adetunji B, Chima G, Isichei C, Gidado S. Prevalence and determinants of occupational exposures to blood and body fluids among health workers in two tertiary hospitals in Nigeria. African J Infect Dis. 2014;8(2):50-54.

15. Mohammed H, Innass K. Needle pricks among health care workers in a tertiary care general hospital, Saudi Arabia: A nine- year survey. Basic Res J MedClalin Sci. 2015;4(11):253-257.

16. Odongkara BM, Mulongo G, Mwetwale C, Akasiima a, Muchunguzi H V, Mukasa S, et al. Prevalence of occupational exposure to HIV among health workers in Northern Uganda. Int J Risk Saf Med. 2012;24:103-13.

17. Kumakech E, Achora S, Berggren V, Bajunirwe F. Occupational exposure to HIV: A conflict situation for health workers. Int Nurs Rev. 2011;58:454-462.

18. Mashoto KO, Mubyazi GM, Mushi AK. Knowledge of occupational exposure to HIV: a cross sectional study of healthcare workers in Tumbi and Dodoma hospitals, Tanzania. BMC Health Serv Res. 2015;15(1):1-6.

19. Erhabor O, Ejele OA, Nwauche CA. Epidemiology and management of occupational exposure to blood borne viral infections in a resource poor setting: the case for availability of post exposure prophylaxis. Niger J Clin Pract. 2007;10(2):100-104.

20. Enwere OO kezie, Diwe KC hiekulie. Knowledge, perception and practice of injection safety and healthcare waste management among teaching hospital staff in south east Nigeria: an intervention study. Pan Afr Med J. 2014;17:218.
21. Kakizaki M, Ikeda N, Ali M, Enkhtuya B, Tsolmon M, Shibuya K, et al. Needlestick and sharps injuries among health care workers at public tertiary hospitals in an urban community in Mongolia. BMC Res Notes. 2011;4(1):184.

Tables

Table 1: Demographic characteristics and Prevalence of Occupational Exposure to HIV Infection among Health care Workers in PMTCT Sites Rivers State, April 2017
| Socio-demographics                                      | 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   |
| Mean age ±SD (years)                                   |     | 35.89±8.4                         |         |
| 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    |

Table 2: Infection Prevention and Patient Safety (IPPS) Standards at PMTCT sites Port Harcourt Nigeria-2017
| Variable                                                                 | Frequency | Percent |
|--------------------------------------------------------------------------|-----------|---------|
| Health workers who trained on IPPS (n=337)                              |           |         |
| Yes                                                                      | 250       | 74.2    |
| No                                                                       | 87        | 25.8    |
| Health care workers who need training on IPPS (n=337)                    |           |         |
| Yes                                                                      | 330       | 98      |
| No                                                                       | 7         | 2       |
| Health care worker last training on IPPS (n=250)                         |           |         |
| Less than a year                                                         | 114       | 45.6    |
| More than a year                                                         | 136       | 54.4    |
| PPE available for Health careworker use at PMTCT facility (n=337)        |           |         |
| Yes                                                                      | 262       | 77.7    |
| No                                                                       | 75        | 22.3    |
| PPE regularly supplied at facility (n=262)                               |           |         |
| Yes                                                                      | 176       | 67.2    |
| No                                                                       | 86        | 32.8    |
| PEP available at PMTCT facility (n=337)                                  |           |         |
| Yes                                                                      | 188       | 55.8    |
| No                                                                       | 149       | 44.2    |
| Someone available to administer PEP at facility (n=188)                 |           |         |
| Yes                                                                      | 176       | 93.6    |
| No                                                                       | 12        | 6.4     |
| Health care workers with access to PEP at facility (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    |
### Table 3: Prevalence and Determinants of Occupational Exposure to Human Immunodeficiency Virus Infection among Health Care Workers in PMTCT Sites Port Harcourt Nigeria-2017

| Factors assessed                     | Exposed (%) | Total | OR (CI)         | AOR (CI)        |
|--------------------------------------|-------------|-------|-----------------|-----------------|
| **Age**                              |             |       |                 |                 |
| 20-29                                | 32(41.0)    | 78    | 1.65 (0.91 - 2.99) | 1.78 (0.86 - 3.71) |
| 30-39                                | 66(42.3)    | 156   | 1.56 (0.95 - 2.58) | 1.80 (0.99 - 3.28) |
| 40≥                                  | 55(53.4)    | 103   | 1               | 1               |
| **Sex**                              |             |       |                 |                 |
| Male                                 | 36(53.7)    | 67    | 1.52 (0.89 - 2.60) | 0.94 (0.46 - 1.92) |
| Female                               | 117(43.3)   | 270   | 1               | 1               |
| **Occupational cadre**               |             |       |                 |                 |
| Doctor                               | 44(69.8)    | 63    | 2.17 (1.14-4.13) *** | 2.22 (1.16-4.25) *** |
| Nurse/midwife                        | 64(51.6)    | 124   | 0.24 (0.13-0.44) *  | 0.10 (0.02-0.46) ** |
| Laboratory scientist/technician      | 25(48.1)    | 52    | 0.87 (0.45-1.66)  | 0.87 (0.45-1.68)  |
| Environmental health worker          | 20(20.4)    | 98    | 1               | 1               |
| **Educational qualification**        |             |       |                 |                 |
| Completed at least Primary           | 5(21.7)     | 23    | 0.24 (0.08-0.67) ** | 2.85 (0.44-18.42) |
| Secondary                            | 18(25.4)    | 71    | 0.30 (0.16-0.53)  | 2.77 (0.57-13.29) |
| Tertiary                             | 130(53.5)   | 243   | 1               | 1               |
| **Years of experience**              |             |       |                 |                 |
| <10 years                            | 89(42.0)    | 212   | 1.45 (0.93 - 2.26) | 0.94 (0.55 - 1.63) |
| ≥10 years                            | 64(51.2)    | 125   | 1               | 1               |
| **Facility type**                    |             |       |                 |                 |
| Public                               | 70(40.9)    | 171   | 0.693 (0.45-1.07) **** | 0.71 (0.44-1.12)  |
| Private                              | 83(50.0)    | 166   | 1               | 1               |
| **Average working hour per week**    |             |       |                 |                 |
| <40 hours                            | 46(50.5)    | 91    | 0.75 (0.47 - 1.22) | 0.53 (0.30 - 0.92) |
| ≥40 hours                            | 107(43.5)   | 246   | 1               | 1               |

*Significant at 0.1%; **Significant at 1.0%; ***Significant at 5.0%; ****Significant 10.0%*
Practice of infection prevention procedures among health care workers in PMTCT sites

**Figure 1**

Decontaminate instruments; WHS/H: Wipe hands with spirit/hand washing; POC/C: Put on closed/covered; WH: Wear heavy duty aprons

**Figure 2**

Sharps disposal in PMTCT sites, PH Metropolis, Rivers State, 2016
Supplementary Files

This is a list of supplementary files associated with the primary manuscript. Click to download.

eq 1.jpg