



## HIV POSTEXPOSURE PROPHYLAXIS IN A TERTIARY HEALTH CARE INSTITUTION IN SOUTHEASTERN NIGERIA: CLIENTS' CHARACTERISTICS AND INDICATIONS FOR INITIATION

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### ABSTRACT

**Background:** Human Immunodeficiency Virus (HIV) has remained an epidemic of public health concern affecting people of all ages and occupation. Postexposure prophylaxis is useful in prevention of seroconversion in event of occupational and non-occupational exposures to infective body fluids. This study is aimed at determining the reasons for indications for PEP against HIV in our study centre.

**Methods:** The study was a retrospective evaluation of the data of subjects that presented for PEP in the Heart-to-Heart HIV Clinic, Federal Medical Centre, Owerri from January 2008 to December 2013. Results are presented as frequencies and percentages. Chi square test was used to assess association.

**Results:** The mean age of the studied subjects was found to be 24.5 years. The age range 15 – 24 (47.6%) and 25–34 years (31.5%) dominated the number of those presenting for PEP with female gender preponderance (83.6%). Rape constituted the major reason for overall presentation for PEP as well as non-occupational reason for exposure while needle prick injury was the major reason for occupational exposure (14.3%). Rape, needle prick, unprotected sex, broken condom, blood contact represented 69.9%, 14.3%, 8.2%, 4.1%, 2.6% and 1.1%, respectively of the subjects presenting for PEP. Students (secondary school and undergraduate students) represented the bulk of the subjects presenting for PEP and also represented majority of the rape cases (80.7%).

**Conclusion:** Rape and needle prick injury represented majority of the cases under study. This finding exposes the vulnerability of the females as well as healthcare providers. Adequate policy against rape





and training on proper handling and disposal of sharp equipment becomes necessary to reduce these occurrences.

**Keywords:** HIV; PEP; Postexposure prophylaxis; Rape; Needle prick, occupational exposure, non-occupational exposure, HIV exposure.

## INTRODUCTION

Human Immunodeficiency Virus (HIV) has remained an epidemic of public health concern<sup>1</sup>. Globally, approximately 36.7 million people are living with HIV at the end of 2016, of which the sub-Saharan African region tops the chart of the epidemic<sup>2,3</sup>. Of all the people living with HIV globally, 9% of them reside in Nigeria according to 2014 Gap report<sup>4</sup>. As of 2016, there were 3.2 million persons living with HIV in Nigeria among whom 30% were assessing antiretroviral treatment or prophylaxis in order to prevent transmission to their children<sup>5</sup>. This statistics placed Nigeria as the country with the largest HIV burden globally after South Africa that constituted 19% of global epidemic which approximates to 7.1 million persons<sup>6,7</sup>.

The Joint United Nations Programme on HIV and AIDS (UNAIDS) made a declaration in 2011 affirming that prevention must remain as the major tact in HIV response. The various methods for HIV prevention constitutes early HIV diagnosis and the use of antiretroviral therapy (ART) to prevent transmission of HIV; pre- and post-exposure prophylaxis<sup>8</sup>. Post-exposure prophylaxis (PEP) is the short term use of antiretroviral therapy to reduce the risk of acquisition of HIV infection following exposure<sup>8</sup>. The World Health Organization (WHO) and International Labour Organization (ILO) recommended PEP in the form of combination regimen (dual/triple) to prevent HIV-seroconversion<sup>9,10</sup> which was adopted and adapted in the Nigeria national guidelines for HIV and AIDS treatment and care which recommended PEP following exposure of an individual to potentially infectious body fluids in occupational settings and non-occupational settings like rape<sup>11</sup>. Tenofovir combined with either Lamivudine or Emtricitabine (TDF+3TC [or FTC]) are preferred backbone drugs for adult PEP while Zidovudine and Lamivudine (AZT+3TC) is recommended for children aged 10 or below<sup>12,13</sup>. Nevirapine-based combinations are generally avoided owing to the large incidence of adverse drug reaction when taken by persons having high level of CD4 lymphocytes which is



usually the case for persons presenting for PEP service<sup>14</sup>. PEP must be initiated as early as possible; within 72 hours of the exposure, as it takes up to 72 hours for HIV to be detected in the regional lymph nodes, up to 5 days to be detected in blood and about 8 days to be detected in cerebrospinal fluid<sup>8</sup>. Initiation within 2 hours is ideal, but certainly within 72 hours and continued for 28 days<sup>15</sup>. Animal studies have demonstrated that initiating PEP within 12, 24 or 36 hours of exposure was more effective than initiating after 48 or 72 hours of exposure<sup>1,17,18</sup>. PEP is more likely to work the earlier it is initiated and with strict adherence to full course of pills<sup>19</sup>. When administered shortly following accidental exposure, PEP has been demonstrated to significantly reduce the risk of HIV infection<sup>20,21,22</sup> even as much as 80-81%<sup>22,23</sup>.

However, the decision to commence post-exposure prophylaxis must take into account the potential benefits of preventing HIV infection as well as the associated risk of toxicity inherent in the medications used. Antiretroviral therapies have well established toxicities and produce adverse events in persons living with HIV/AIDS<sup>10,24,25</sup>.

This study was aimed at determining the reasons for indications for PEP against HIV in Federal Medical Centre Owerri. The generated information may aid future planning and policy making as there is paucity of data in the subject area in the study population.

## **METHODOLOGY**

This study was carried out in Owerri, the state capital of Imo State, Nigeria. Imo state has a population of about 3,927,563 according to the 2006 National Population Census<sup>26</sup> and has HIV prevalence of 2.5% as against the national prevalence of 3.4%<sup>27</sup>. Retrospective descriptive design was adopted in this study. Data were retrospectively extracted from the PEP register of the “Heart-to-Heart” Clinic of Federal Medical Centre, Owerri from January 1, 2008 to December 31, 2013. Federal Medical Centre is among the two tertiary health care facilities in Imo State. It serves as the main tertiary healthcare facility as Imo State University (the second tertiary hospital) is located outside the urban city of Owerri (Orlu). Generated data were analyzed using SPSS version 22 (IBM Corps, Armonk, NY, USA). Categorical variables were represented with frequencies and percentages. Chi square was used



to assess association between categorical variables. Statistical significant difference determined at alpha value of 0.05.

## RESULTS

The mean age of the studied subjects was found to be 24.5 years. The subjects presenting for PEP administration were predominantly females (83.06%) with female to male ratio of 4.9 : 1.0 out of the 803 persons presenting for PEP within the study period. Age group of 15–24 (47.57%) and 25–34 years (31.51%) constituted majority of the participants. Rape (69.61%) and Needle prick (14.32%) were the major causes of exposure that necessitated the presentation for PEP. Students constituted majority (63.80%) of the subjects comprising more than half of the total studied population (Table 1).

Table 1: Demographic characteristics of subjects presenting for PEP in the studied centre

Parameter	Frequency	%
<b>GENDER</b>		
Male	136	16.9
Female	667	83.1
<b>AGE (Years)</b>		
0-14	90	11.2
15-24	382	47.6
25-34	253	31.5
35-44	51	6.4
45-54	17	2.1
55-64	4	0.5
65+	6	0.7
<b>EXPOSURE ROUTE</b>		
Rape	559	69.6



Needle prick	115	14.3
Broken condom	33	4.1
Unprotected sex	66	8.2
Human bite	9	1.1
Blood contact	21	2.6
OCCUPATION		
Civil servant	60	7.5
Doctor	44	5.5
House wife	7	0.9
Lab. Scientist/Technician	30	3.7
Student	512	63.8
Trader/Business person	65	8.1
Nurse	25	3.1
Applicant	41	5.1
Unemployed	3	0.4
Force personnel	2	0.2
Corpse member	13	1.6
Other health care workers	1	0.1

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Lab: Laboratory

Table 2 shows the distribution of the subjects presenting for PEP based on age and gender. Rape, needle prick, unprotected sex, broken condom, blood contact represented 69.6%, 14.3%, 8.2%, 4.1%, 2.6% and 1.1%, respectively of the persons presenting for PEP in our study centre. Rape was the major reason for presenting for PEP for age ranges of 0–14, 15–24, 25–34, 35–44 and 65+ years age ranges with female preponderance while needle prick was the major means of exposure necessity PEP in the age group 45–54 and 55–64 years. Exposure due to rape and human bite had their highest incidence in the age range 15–24 years while exposure due to needle prick, broken condom, unprotected sex and blood contact had their highest incidents in the 25–34 years category. Needle



prick was the major (84.6%) reason for occupational exposure while rape was the major reason for non-occupational (83.8%) as well as overall (69.6%) reason for presenting for PEP.



Table 2: Distribution of the subjects presenting for PEP based on age, gender and routes of exposures.

Age (Years)	Non-occupational exposure						Occupational exposure						Total (%)
	Rape		Broken condom		Unprotected sex		Human bite		Needle prick		Blood contact		
	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)	
0-14	4 (4.4)	84 (93.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	90 (11.2)
15-24	3 (0.8)	325 (85.1)	5 (1.3)	4 (1.0)	5 (1.3)	18 (4.7)	1 (0.3)	3 (0.8)	5 (1.3)	8 (2.1)	2 (0.5)	3 (0.8)	382 (47.6)
25-34	0 (0.0)	120 (47.4)	17 (6.7)	2 (0.8)	25 (9.9)	7 (2.8)	1 (0.4)	2 (0.8)	38 (15.0)	30 (11.9)	6 (2.4)	5 (2.0)	253 (31.5)
35-44	0 (0.0)	15 (29.4)	3 (5.9)	1 (2.0)	4 (7.8)	3 (5.9)	0 (0.0)	2 (3.9)	5 (9.8)	15 (29.4)	2 (3.9)	1 (2.0)	51 (6.4)
45-54	0 (0.0)	4 (23.5)	1 (5.9)	0 (0.0)	2 (11.8)	1 (5.9)	0 (0.0)	0 (0.0)	2 (11.8)	7 (41.2)	0 (0.0)	0 (0.0)	17 (2.1)
55-64	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (50.0)	1 (25.0)	1 (25.0)	4 (0.5)
65+	0 (0.0)	4 (66.7)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	6 (7.5)
Total	552 (0.9)	552 (68.7)	26 (3.2)	7 (0.9)	37 (4.6)	29 (3.6)	2 (0.2)	7 (0.9)	53 (6.6)	62 (7.7)	11 (1.4)	10 (1.2)	803 (100)
	559 (69.6)		33 (4.1)		66 (8.2)		9 (1.1)		115 (14.3)		21 (2.6)		



Non-occupational reasons for presenting for PEP constituted majority (83.1%) of the cases of the subjects presenting for PEP. Gender analysis of the non-occupational reasons for presenting for PEP showed that females represented most (89.2%) of the cases for non-occupational (52.9%) reasons for presenting for PEP. The gender distribution in both categories significantly vary ( $P=0.024$ ) (Table 3).

Table 3: Distribution of subjects presenting for PEP based on occupational category and gender

Gender	Occupational exposure (%)	Non-occupational exposure (%)	X <sup>2</sup>	P-value
Male	64 (47.1)	72 (10.8)	105.6	0.000
Female	72 (52.9)	595 (89.2)		
Total	136 (16.9)	667 (83.1)		

Rape constituted the major reason for presenting for PEP among students (88.1%;  $n = 451/512$ ), Housewives (100%;  $n = 7/7$ ), Trades/Business men and women (63.1%;  $n = 41/65$ ), Applicants (82.9%;  $n = 34/41$ ), Force personnel (100%;  $2/2$ ), while Needle prick was the major cause for presentation among civil servants (36.7%;  $n = 22/60$ ), Doctors (72.7%;  $n = 32/44$ ), Laboratory Scientists and Technicians (70.0%;  $n = 21/30$ ) and Nurses (80.0%;  $n = 20/25$ ). Unprotected sex was the major causes of exposure among the unemployed (66.7%;  $n = 2/3$ ) and Youth Corps members (69.2%;  $n = 9/13$ ). Rape as a reason for presenting for PEP had its highest case in students (80.7%;  $n = 451/559$ ), while those presenting for PEP owing to needle prick had their highest case in doctors (27.8%;  $n = 32/115$ ). Similarly, Broken condom as a reason for presenting for PEP had its highest incidence in students (51.5%;  $n = 17/33$ ), while unprotected sex as a reason for presentation had its highest incidence in students (42.4%;  $n = 28/66$ ). Human bite and blood contact as reasons for presenting for PEP had their highest incidence in traders and businessmen/students (33.3%;  $n = 3/9$ ) and doctors (47.6%;  $n = 10/21$ ), respectively (Table 4).



Table 4: Distribution of subjects presenting for PEP based on Occupation and route of exposure

Occupation	Non-occupational exposure				Occupational exposure			Total (%)
	Rape (%)	Broken condom (%)	Unprotected sex (%)	Human bite (%)	Needle prick (%)	Blood contact (%)		
Civil servant	19 (31.7)	6 (10.0)	8 (13.3)	2 (3.3)	22 (36.7)	3 (5.0)	60 (7.5)	
Doctor	0 (0.0)	0 (0.0)	2 (4.5)	0 (0.0)	32 (72.7)	10 (22.7)	44 (5.5)	
House wife	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (0.9)	
Lab. Scientist/Tech.	1 (3.3)	0 (0.0)	6 (20.0)	0 (0.0)	21 (70.0)	2 (6.7)	30 (3.7)	
Student	451 (88.1)	17 (3.3)	28 (5.5)	3 (0.6)	12 (2.3)	1 (0.2)	512 (63.8)	
Trader/business person	41 (63.1)	9 (13.8)	7 (10.8)	3 (4.6)	4 (6.2)	1 (1.5)	65 (8.1)	
Nurse	2 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	20 (80.0)	3 (12.0)	25 (3.1)	
Applicant	34 (82.9)	1 (2.4)	4 (9.8)	0 (0.0)	2 (4.9)	0 (0.0)	41 (5.1)	
Unemployed	0 (0.0)	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	3 (0.4)	
Force personnel	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.2)	
Corps member	2 (15.4)	0 (0.0)	9 (69.2)	0 (0.0)	1 (7.7)	1 (7.7)	13 (1.6)	
Other HCWs	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1 (1.6)	
Total	559 (69.6)	33 (4.1)	66 (8.2)	9 (1.1)	115 (14.3)	21 (2.6)	803	



Figure 1 shows that trend of presentation for PEP for the years of study. The frequency increased as the year increases.

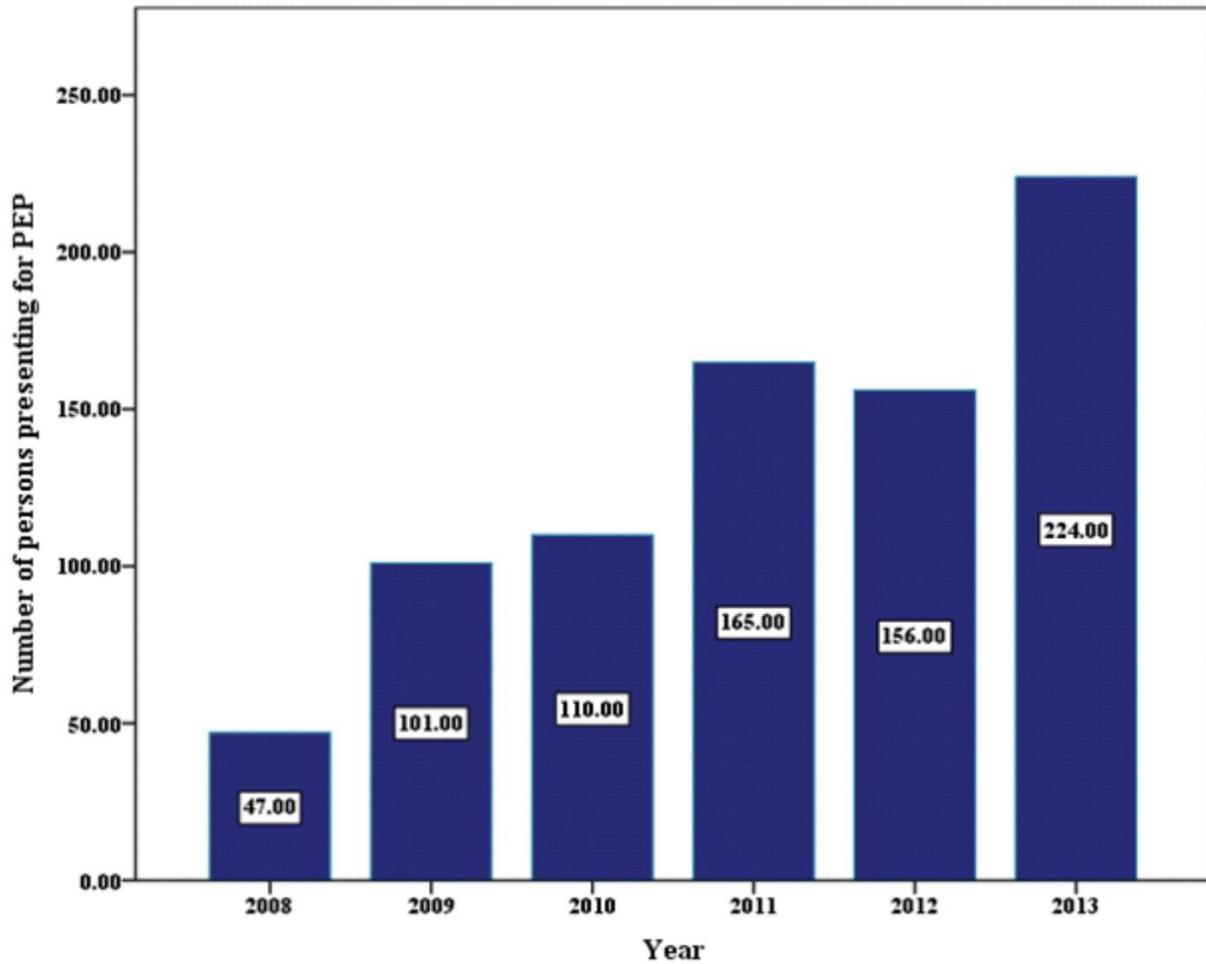


Figure 1: Distribution of the frequency of the subjects presenting for PEP based on the year of occurrence.



Figure 2 shows the trend of indication for PEP across the years. The trend across the years was consistent as rape and needle prick maintained major indications for PEP across the years. More so, the total number of subjects presenting for PEP across the years increases as the year proceeds.

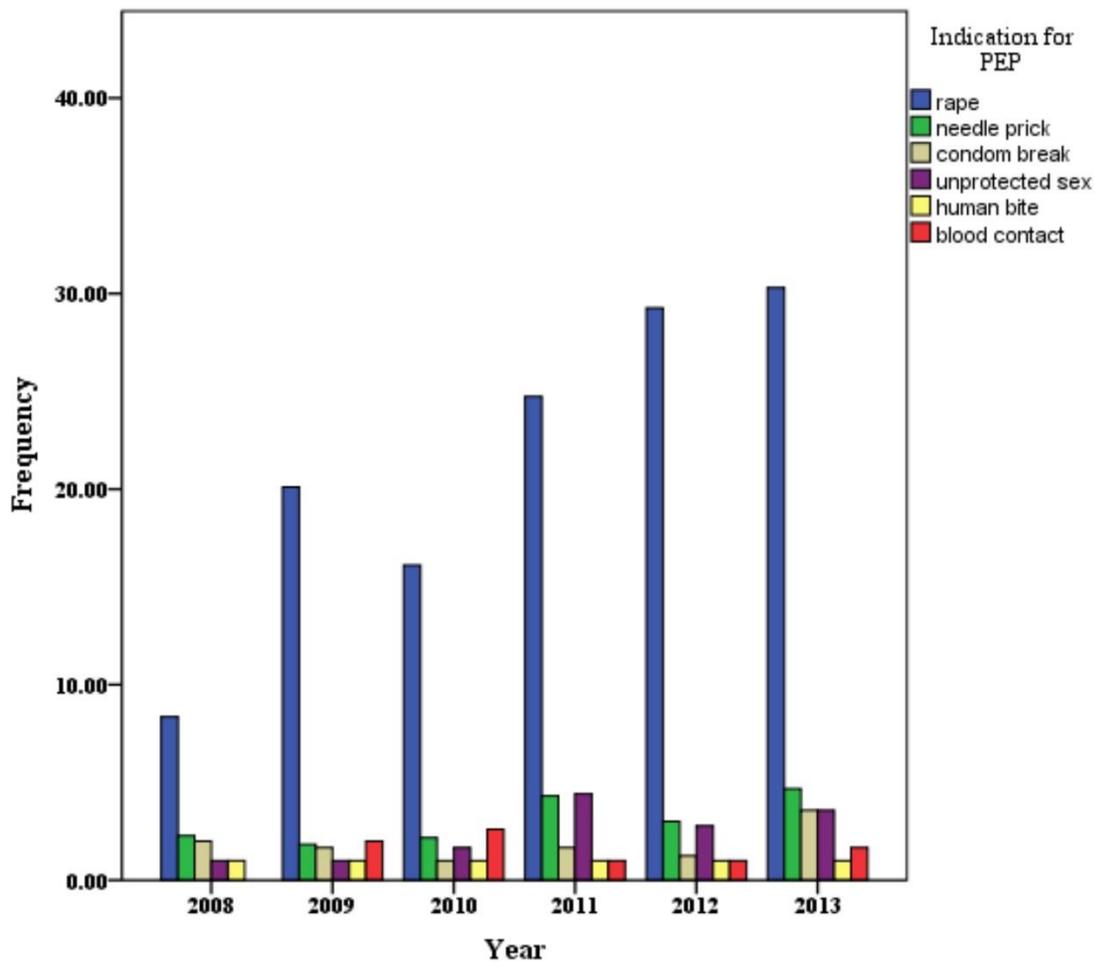


Figure 2: The trend of indication for PEP across the years.



## DISCUSSION

We observed in this study that more females (83.06%) presented for PEP service than males (16.94%). This trend is consistent with previous studies; Onyedum *et al.*<sup>14</sup>, Olowookere *et al.*<sup>28</sup> and Erhabor *et al.*<sup>29</sup> who reported 63.8%, 75% and 61.5% respectively. They also reported female preponderance in presentation for PEP in studies in Nigeria. In similar vein, Tette *et al.*<sup>10</sup>, Merchant *et al.*<sup>30</sup> and Silka *et al.*<sup>31</sup> reported 60.0%, 63.6% and 63.9% from studies in Accra (Ghana), Rhode island and Kenya respectively. It is pertinent to note that the study by Erhabor and colleagues, and Tette *et al.*, unlike others were conducted for only healthcare workers.

Further stratification of our data into occupational and non-occupational reasons for presentation for PEP in both genders showed that females constituted majority (89.2%) of non-occupational reason for presenting for PEP while males conversely constitute majority (52.9%) of occupational reasons for presenting for PEP. This is in consonance with earlier report by Silka and colleagues<sup>31</sup>. This is due to domination of the non-occupational reasons by rape in the female gender. However, elimination of rape in the non-occupational reason for presentation of PEP will pull both genders almost at par with little tilt to the male gender (1.5:1; M:F). This finding partly explained the reasons for the female preponderance in overall presentation for PEP.

Rape constituted the most common (69.6%) reasons for presentation for PEP as well as the most common reason for non-occupational route of exposure in this study. This observation is in consonance with previous reports<sup>28,31</sup>. However, the finding is at variance with the report of Onyedum *et al.*<sup>28</sup>, who reported needle prick as the most common reason for presenting for PEP. The high frequency of rape as a route of exposure necessitating for presentation for PEP is worrisome and presents a public health concern. Rape is a severely traumatic experience that affects women, girls and sometimes males<sup>32,33</sup> usually involving lack of consent, use of physical force, threat or deception, coercion and more. Rape is a pandemic crime that is mostly underreported in low income countries<sup>34</sup> mostly due to stigmatization, and poor/non-prosecution of sex offenders<sup>34-36</sup>. Further probe into rape data of our study revealed that females were majority in the cases presenting for PEP



for rape. Although other studies<sup>28,31</sup> did not stratify the rape cases into gender, ours showed that a fraction (1.25%) of the cases involved males betraying the usual focus of rape on females only, including in researches. The male rape cases were comparatively younger (0 – 24 years) than their female counterparts (0 - ≥ 65 years) suggesting that they were taken advantage of. The societal norm is unlikely to expect males to be raped, hence, parents and guardians leave their wards under the care of potential assailants. More so, majority of the subjects presenting for PEP based on rape route of exposure were within the age 0–34 years age range with an outlier at the 15–24 years age range. Such trend is well documented<sup>32,34,37</sup>. Adolescent period is a period of adventure and experimentation at which the young ones unknowingly engage in behaviours that may expose them to sexual assault<sup>38</sup>.

Needle prick was the second most common reason for presentation for PEP as well as the most common reason for occupational exposure. Needle prick as major source of occupational exposure has been previously documented<sup>10,30</sup>. Further analysis showed that doctors represented the majority (27.82%) of the subjects presenting for PEP due to exposure by needle prick as well as occupational exposure among health care workers. This observation is in keeping with previous report<sup>29</sup>. However, this observation is contrary to the report of Olowookere and colleague<sup>28</sup> and Tette *et al.*<sup>10</sup>, who reported nurses to constitute majority of those presenting for PEP on the ground of occupational exposure via needle prick. This disparity is due to the differences in various hospitals' bureaucracies and policies. In some hospitals, most intravenous injections and phlebotomy procedures are carried out by doctors, while in some, the responsibility is left in the hands of nurses and medical laboratory scientists/technicians or shared among the three professional groups. Although our study did not stratify the occupations into cadre, previous study by Onyedum and colleagues<sup>14</sup> showed that house officers contributed bulk of the doctors presenting for PEP. Adjusting for the proportion of the occupation present and the number exposed via needle prick showed that 80.0% of the nurses presented for PEP were for needle prick exposure while 72.2% and 70.0% of the doctors and laboratory scientists/technicians present were for needle prick route of exposure. In similar vein, doctors constituted majority of the cases presenting for PEP for blood contact (47.6%). This observation indicates need for adoption and strict adherence to universal precaution guidelines in



our study environment as most of the occupational exposures result from breach of universal precautions. The panacea includes provision of sharp containers, training of staff in the risk of contracting nosocomial infectious diseases, appropriate use and disposal of needles and other sharp instruments, appropriate washing and the use of personal protective equipment such as gloves, masks, gowns, goggles as well as use of retractable needles<sup>39</sup>. The implication of these findings is the need for training and retraining of health care workers on behavioral modifications towards universal precautions and use of personal protective equipment (PPE); zero needle recapping, appropriate disposal of sharps and more. Previous studies indicate that awareness<sup>8</sup>. Knowledge and practice of PEP among health care workers, mostly in developing countries are poor. There is also need to establish a system that incorporates written protocol for prompt reporting, evaluation and counselling, treatment and follow-up of exposed health care workers that are at risk of infectious diseases<sup>29</sup>.

The age range 15–24 years represented the greatest proportion of persons presenting for PEP in our study centre. This observation is in consonance with previous reports<sup>1,30</sup>. This observation is due to the fact that this age range constituted 58.1% of those presenting for PEP on the grounds of rape. More so, the age range 25–34 years of our study constituted majority of those presenting for PEP on occupational grounds. This is possibly due to the fact that the age group 25–34 represents the major work force of the society<sup>41</sup>.

Students represented the overall major category presenting for PEP. This finding is similar to the report of Olowookere and colleague<sup>14</sup> who also reported students as the major groups presenting for PEP. This trend in our study is due to the fact that 88.1% of the students presented for PEP were exposed via rape and as well constituted 80.7% of the rape cases. This observation implicates a public health concern. There is need for anti-rape campaign in the universities to clamp down the high incidence of rape and sensitize prospective victims on indicators of rape.



Data from the study showed that the number of persons presenting for PEP increased as the years proceeds. This is possibly due to increased awareness efforts by the various intervention programmes towards the prevention and management of HIV/AIDS in Nigeria over the years<sup>42,43,44</sup>.

### **LIMITATIONS**

This study took a retrospective approach, hence, inherent problems with retrospective studies such as missing data were present. Cadre of health care workers, details on follow up, exact time of reporting for PEP were not documented. More so, caution should be adhered when extrapolating the data on presentation for PEP following exposure in health workers as the frequencies may depend on level of awareness and participation of each group and not necessarily equate to the relative risk of exposure of each of the occupational groups.

### **CONCLUSION**

We found that rape and needle prick injury were major reasons for presentation for PEP representing both occupational and non-occupational exposures with majority in the age range of 15–34 years with female gender preponderance. Students represented the majority of the groups presenting for PEP. We recommend anti-rape campaign and strict adherence to universal precautions to reduce the incidence of rape and occupational exposures, respectively.

### **Ethics approval and consent to participate**

This study was approved by the Federal Medical Centre Owerri Ethical Committee. As only secondary data was used in this study, consent to participate was not required.

### **Availability of data and material**

Datasets generated and analysed in this study are available from the corresponding author on request.



### Competing interest

The authors declare no conflict of interest

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There was no specific funding for this study.

**Authors' contributions:** ECU conceived the study, performed data curation, edited the initial manuscript draft. HUO analysed data, performed literature search, did statistical analysis, and prepared the initial manuscript draft. Both authors read and approved the final manuscript.

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