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# Prevalence and Factors Associated with Occupational HIV Exposure and Post Exposure Prophylaxis among Health Workers: A Case Study of Kiambu County, Kenya, 2017

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**Abstract** Occupational health risk of Human Immunodeficiency Virus (HIV) to health care workers (HCWs) is a burden in the health sector. This determines the prevalence of HIV exposure, uptake of Post Exposure Prophylaxis (PEP) among the exposed HCWs and associated factors in Kiambu County, Kenya. A hospital-based cross-sectional quantitative study was carried out in Kiambu and Thika hospitals from April to June 2017. Probability proportionate to size sampling was used to identify 108 and 184 HCWs from Kiambu and Thika. Simple random sampling was used to select participants by cadre from each site. Data was analyzed using EPI Info 7. Bivariate analysis was used to assess association between outcome variables and demographic and occupational characteristics. Odds ratio (OR) and 95% Confidence Interval (CI) was used and variables with P-value of <0.20 were entered into multiple regression. A total of 292 HCWs were interviewed. The mean age of respondents was 33.4 years (SD± 9.40), 166 (58.90%) were females, nurses 108 (37%) and 174 (59.59%) were married. Overall prevalence of exposure to HIV was 120/292 (41.1%), 67/ (55.8%) were female, needle stick exposure was 48/120 (40%). Among the exposed, 43 (35.8%) were initiated on PEP out of which 30/43 (70%) completed the treatment course. Results showed doctors (120 aOR 4.6; 95% CI: 1.6-12.6) and work experience of ≤ 5 years (aOR 2.2; 95% CI: 1.0-5.2) to be most at risk of HIV exposure. Age 35-44 years (aOR 4.7; 95% CI: 1.0-23) was associated with PEP uptake. The prevalence of occupational exposure to HIV was high among HCWs, and common route of exposure was needle stick injuries. Age 35-44 years was associated with PEP uptake whereas being a doctor and work experience of ≤ 5 years was associated with significant HIV exposure. Therefore, the study recommended mandatory infection control and prevention training for new employees and adequate counseling to reduce stigma to exposed HCWs.

***Keywords:*** *human immunodeficiency virus, post exposure prophylaxis, health care workers, prevalence, occupational exposure*

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## 1. Introduction

Post-exposure prophylaxis (PEP) involves taking antiretroviral therapy (ART) for a short period of time to reduce the likelihood of becoming HIV positive after high-risk exposures to HIV. However, PEP is ineffective if initiated more than 72 hours after exposure [1]. Most guidelines do not recommend starting PEP after this 72-hour period, and some recommend even shorter periods for initiation.The existing difference occurs due to the fact that no prospective studies have been done in humans to assess the exact time for PEP initiation after exposure. However, animal trials have shown an upward trend in failure in initiation of PEP by 48-72 hours after exposure [2].

PEP involves a procedure that focuses on first aid, counselling, risk assessment and laboratory screening with consent of the exposed. It includes a short term treatment of 28 days with antiretroviral drugs [3]. According to Kenya National Aids and Sexually transmitted infections Control Program (NASCOP), PEP is a short course of

ART administration that reduces the likelihood of becoming HIV positive after events involving high risk of HIV exposure and is ineffective if it is administered 72 hours after exposure [4]. Most of the guidelines do not advocate initiation of PEP after this period and others recommend even shorter period. Considerations prior to prescription of PEP after an occupational exposure to HIV is based on a risk assessment, which takes into account the type of exposure, the characteristics of the source patient and the material to which the HCW is exposed [5].

The first line treatment consists of a backbone of two nucleotides or nucleosides reverse transcriptase inhibitors e. g zidovudine or tenofovir plus lamivudine and a non-nucleoside reverse transcriptase inhibitor such as nevirapine or efavirenz [6]. The second line of treatment comprising the use of tenovofir plus lamivudine or zidovudine plus lamivudine as the backbone [7]. PEP treatment is said to reduce risk of HIV infection to a great extent [8]. Studies have shown that transmission of HIV can greatly be reduced by PEP administration where a sharp decline in vertical transmission has been observed for example in AIDS Clinical Trial Group (ACTG) 076 [27] where pregnant women and their newborns were treated with immunotherapy with zidovudine and a study on perinatal HIV prevention, [9] in which a single dose of nevirapine was compared with zidovudine. A retrospective case control study using zidovudine after HCWs were exposed showed that there was 81% reduction in HIV infection in individuals who got treated with zidovudine [10].

Post exposure prophylaxis (PEP) is critically important for reducing the risk of HIV infection among health workers who experience occupational exposure to HIV [11]. Health workers are at high risk of contracting HIV through needlestick injuries, contact with infected blood or bodily fluids, and other exposure incidents in the line of duty. However, studies have shown that PEP completion rates remain low, with many exposed individuals failing to adhere to and complete the full course of antiretroviral treatment. Incomplete PEP regimens reduce the effectiveness of the drugs in preventing HIV infection and increase the risk of developing drug resistance [5].

Occupational exposure to HIV is a significant occupational health issue facing the healthcare system in Kenya [12]. Health workers are on the frontlines caring for people living with HIV and are continually exposed to the risk of accidental infections. Kiambu County has a high HIV prevalence and its health facilities experience a high patient volume. However, little is known about the prevalence and factors influencing occupational HIV exposure incidents and uptake of PEP among health workers in the county. Understanding these issues is critical to developing interventions to better protect this at-risk population. Timely initiation and completion of PEP is key to reducing HIV transmission to exposed health workers. This study therefore aimed to address this knowledge gap to enhance HIV prevention efforts for healthcare workers in Kiambu County.

# 2. Methodology

## 2.1. Study Design

A cross sectional hospital based study was done in two referral health facilities in Kiambu County; Kiambu level four and Thika level five hospitals.

## 2.2. Study Population

The study population consisted of health care workers who directly or indirectly attend to patients selected from the two hospitals. They included doctors, clinical officers, laboratory officers, nurses, interns/students, mortuary attendants and cleaners.

## 2.3. Sample Size

A sample size was calculated using [13] formula:-

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where,

$n$ is the sample size

$z$ is the critical value based on the desired confidence level ($z$ = 1.96 for 95% confidence level);

$d$ is the margin of error or precision of the estimate in this case $m =$ 0.05

$p$ is the estimated value of the proportion occupational HIV exposure prevalence = 46% [14]. Therefore;

$$n = \frac{1.96^2 \times 0.46(1-0.46)}{0.05^2} = 381$$

Since the exact number of source population of respondents was less than 10,000, the following correction formula was used;

$$nf = \frac{n_i}{(1+{}^{n_i}/_{N})}$$

Where; $nf$ = corrected sample size, $n_i$ = uncorrected sample size and $N$ = the total number of all the source population.

Therefore;

$$nf = \frac{381}{(1+{}^{381}/_{914})} = 269$$

Ten percent for non-response rate was added to the sample; 269+10% $of$ 269 $\cong$ 296

## 2.4. Sampling Procedure

Probability proportionate to size sampling and simple random sampling was employed to identify participants from each site. The first stage was to allocate the study participants (296) to both facilities proportionally depending on their HCWs' population i.e. to calculate the total number of participants from each hospital, all HCWs (numerator) for particular facility was divided by total of both hospitals (denominator) then multiplied by the sample size. To identify study participants per cadre, the total of HCWs (numerator) in specific cadre was divided by the number of all HCWs (denominator) in that facility then multiplied by the total number of expected participants from the facility. Lastly, sampling frame per cadre was done for each facility and ballot selection method used to identify study participants per cadre. The sampling

procedure is diagrammatically presented in Figure 1.

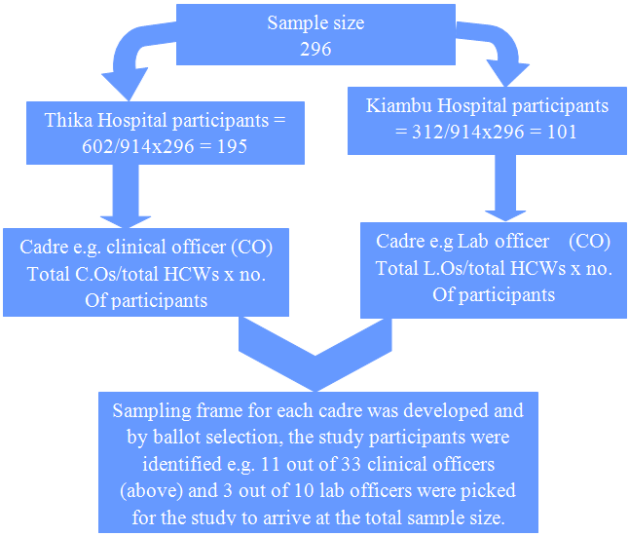


**Figure 1.** Diagrammatic representation of the sampling procedure

## 2.5. Inclusion and Exclusion Criteria

Health Care Workers (HCW) attending to patients during the time of study were included. Health Care Workers assigned administrative or managerial duties were excluded in the study.

## 2.6. Data Collection

This study used structured questionnaires for data collection. The questionnaire obtained information on demographic and professional characteristics. Personal risk factors for HIV exposure related to occupation were collected, such as work station, type of exposure and circumstances of specific incidences of contact with blood and body fluids; depth of injury if percutaneous (deep or superficial), body part exposed, procedure under which exposure occurred and use of personal protective equipment. Information on PEP awareness and post exposure management was also included. PEP register was also reviewed to denote reported exposures and PEP uptake. The questionnaire was pre-tested in Kerugoya Referral Hospital in Kirinyaga County before the study began to check for consistency and any ambiguity. Interviewers were trained and were involved in the pre-test and revisions were made on the questionnaire based on the findings. The questionnaires were administered to respondents by the trained interviewers and the principal investigator led the exercise.

## 2.7. Data Processing and Analysis

Data was entered from questionnaires, cleaned and analysed using EPI Info 7 (CDC, Atlanta, GA, USA). Descriptive analysis characterised the demographic and occupational data from the study population. This was carried out using frequencies, proportions and means. The prevalence of HIV exposure was also determined. Frequency of reporting and proportion of those who received PEP were also determined to compare the reporting and PEP uptake rate. Bivariate analysis was used to assess association between outcome variables and demographic and occupational characteristics. Odds ratios and 95% CI was used and variables with p-value of less than 0.20 were entered into multiple regression to identify independent factors significant for HIV exposure and PEP uptake.

## 2.8. Ethical Considerations

Ethical clearance was obtained from Moi University's Institutional Research and Ethics Committee (IREC) (FAN: IREC 1789) and from Health Research and Development Unit, Kiambu County (KIAMBU/HRDU/AUTHO/2017/01/20. Written informed consent was sought from the participants before the interview.

# 3. Results

## 3.1. Preliminary Analysis

The preliminary analysis involved analyzing the demographic characteristics of the respondents, testing the differences in exposure in the two health institutions and also obtaining the distribution of the health workers by cadre.

On analysis of the demographic characteristics of the respondents, the results showed that among the 292 HCWs interviewed, 166 (58.9 %) were females, nurses were 108 (37%) and 174 (59.59%) were married (Table 1. The mean age of the respondents was 33.4 and a standard deviation of 9.4 (Table 1).

**Table 1. Demographic characteristics of the respondents**

| Variable | Frequency | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 126 | 43.2 |
| Female | 166 | 56.8 |
| **Age Category** | | |
| Below 25 | 34 | 11.5 |
| 25-34 | 146 | 50.0 |
| 35-44 | 66 | 22.6 |
| 45-49 | 18 | 6.1 |
| >50 | 28 | 9.5 |
| **Mean age in years (SD)** | 33.4 (9.4) | |
| **Marital status** | | |
| Divorced | 3 | 1.0 |
| Married | 174 | 59.6 |
| Never married | 98 | 33.7 |
| Separated | 10 | 3.4 |
| Widowed | 7 | 2.4 |
| **Cadre** | | |
| VCT counsellors | 6 | 2.1 |
| Cleaners | 55 | 18.8 |
| Clinical officers | 23 | 7.9 |
| Dentists | 7 | 2.4 |
| Interns/student | 51 | 17.5 |
| Laboratory technologists | 10 | 3.4 |
| Medical doctors | 28 | 9.6 |
| Mortuary attendants | 4 | 1.4 |
| Nurses | 108 | 40.0 |
| **Received Infection prevention training** | 148 | 50.7 |

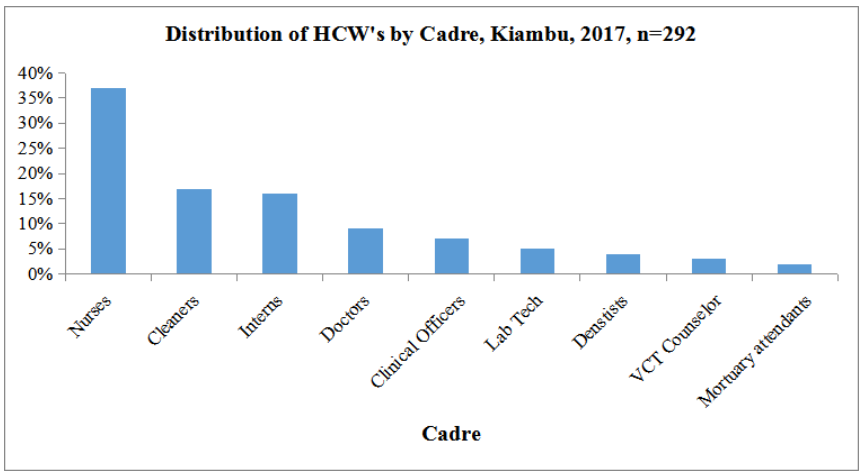


**Figure 2.** Distribution of the respondents by cadre, Kiambu County, 2017 (n=292)

**Table 2. Differences in HIV exposure among the respondents from Thika & Kiambu health facilities**

| Characteristic | Thika hospital | Kiambu hospital | z-score | p- value |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 82 (44.6%) | 45 (41.7%) | 0.48 | 0.63 |
| Female | 102 (55.4%) | 63 (58.3%) | 0.48 | 0.63 |
| **Age Category** | | | | |
| Below 25 | 20 (10.9%) | 14 (13%) | -0.53 | 0.59 |
| **25-34** | **82 (44.6%)** | **64 (52.3%)** | **-2.42** | **0.02 *** |
| **35-44** | **49 (26.6%)** | **17(15.7%)** | **2.14** | **0.03 *** |
| 45-49 | 13 (7.1%) | 5 (4.63%) | 0.84 | 0.40 |
| >50 | 20 (10.9%) | 8 (7.4%) | 0.97 | 0.33 |
| **Marital status** | | | | |
| Married | 111 (60.3%) | 66 (61.1%) | -0.13 | 0.89 |
| Divorced | 62 (33.7%) | 37 (34.3%) | -0.09 | 0.92 |
| Never married | 2(1.1%) | 0 (0.0%) | | |
| Separated | 5 (2.7%) | 4 (3.7%) | -0.47 | 0.63 |
| Widowed | 4 (2.3%) | 1 (0.9%) | | |
| **Cadre** | | | | |
| VCT counselors | 2(1.1%) | 4 (3.7%) | -1.52 | 0.13 |
| **Cleaners** | **25 (13.6%)** | **30 (27.8%)** | **-3.0** | **0.003 *** |
| Clinical officers | 16(8.7%) | 7 (6.5%) | 0.68 | 0.50 |
| Dentists | 4 (2.3%) | 3 (2.8%) | 0.33 | 0.74 |
| Interns/student | 32 (17.4%) | 19(17.6%) | 0.44 | 0.97 |
| Laboratory technologists | 7 (38%) | 3 (2.8%) | 0.47 | 0.64 |
| Medical doctors | 20 (10.9%) | 8 (7.4%) | 0.97 | 0.33 |
| Mortuary attendants | 2 (1.1%) | 2(1.9%) | -0.54 | 0.59 |
| **Nurses** | **76 (41.3%)** | **32 (29.6%)** | **1.99** | **0.05 *** |
| **Received Infection prevention training** | 90 (48.9%) | 55 (50.9%) | 0.33 | 0.74 |
| Time of exposure | | | | |
| Day | 56 (30.4%) | 40 (37.0%) | -1.15 | 0.25 |
| Night | 16(8.7%) | 8 (7.4) | 0.39 | 0.70 |
| **Wearing of PPEs** | | | | |
| Yes | 63 (34.2%) | 43 (39.8%) | 0.95 | 0.33 |
| No | 9 (4.9%) | 5 (4.6%) | 0.101 | 0.92 |
| **Prevalence of exposure** | 72 (39.1%) | 48 (44.4%) | 0.891 | 0.37 |
| PEP uptake | | | | |
| Initiated | 25 (13.9%) | 18(16.7%) | 0.71 | 0.47 |
| Not initiated | 47 (86.1%) | 30 (83.3%) | 0.41 | 0.67 |

*significantly different at 5% level of significance

On analyzing the differences in exposure in the two health institutions, the results showed that there was a significant difference in ages 25-34 (p-value = 0.02), 35-44 (p-value = 0.03) and in cadre, cleaners (p-value = 0.003) and Nurses (p-value = 0.05) (Table 2). There was no significant difference on exposure in the two health institutions (p-value = 0.37) (Table 2).

On analysis of the distribution of the respondents by cadre, the results showed that nurses were 108 (37.00%), cleaners were 55 (18.84%) and 51 (17.475%) were interns (Figure 2)

## 3.2. Prevalence of HIV Exposure among HCWs

The prevalence of HIV exposure among the HCWs was determined by analyzing the proportions of the respondents exposed under different study variables such as sex, cadre, working station, site and depth of penetration. The overall prevalence of HCWs occupational exposure to HIV was 120 (41.10%) (Table 3). The results also a higher prevalence of HCWs occupational exposure to HIV among females as compared to males (Table 3).

**Table 3. Prevalence of HCWs to HIV exposure by sex, Kiambu County, 2017 (n=292)**

| Sex | Exposed n % | Not Exposed n % | Total |
|---|---|---|---|
| Male | 53 (18.2) | 73 (25.0) | 126 (43.2) |
| Female | 67 (22.9) | 99 (33.9) | 166 (56.8) |
| Total | 120 (41.1) | 172 (58.9) | 292 (100.0) |

On analysis Prevalence of HCWs to HIV exposure by cadre, the results showed that among all types of exposure, needle stick (sharps injury) was 48 (40.0%) and body fluids (Secretions, splashes) 35 (29.2%) (Table 4). The proportion of exposure among doctors was 15.8% (Table 4).

Analysis of Distribution of exposure by working station showed that the proportion of exposure in Maternity ward was 22 (18.3%) followed by medical ward 20 (16.7%) (Figure 3). “Others” 17 (14%) were Comprehensive Care Centre (CCC) 3 (2.5%), Eye clinic 5 (4.1%), paediatric ward 5 (4.1%) Voluntary Counselling and Testing (VCT) 4 (3.3%) (Figure 3).

**Table 4. Distribution of Type of Exposure by cadre, Kiambu County, (n=120)**

| Cadre | Exposure type n (%) | | | | Total n (%) |
|---|---|---|---|---|---|
| | Sharps (needle stick, lancet) | Body fluids (secretions, splashes) | Blood | Blood products | |
| Nurse | 11(9.2) | 15(12.5) | 13(11.0) | 0 (0.0) | **39 (32.5)** |
| Intern | 9 (7.5) | 5 (4.2) | 10(8.3) | 0 (0.0) | **24 (20.0)** |
| Cleaner | 15 (12.5) | 4(3.3) | 3 (2.5) | 1 (0.8) | **23 (19.2)** |
| Medical doctor | 7 (5.8) | 8 (6.7) | 3 (2.5) | 1(0.8) | **19 (15.8)** |
| Clinical officer | 1(0.8) | 1 (0.8) | 3 (2.5) | 1(0.8) | **6 (5.0)** |
| VCT Counsellor | 2(1.7) | 0 (0.0) | 1 (0.8) | 0 (0.0) | **3 (2.5)** |
| Dentist | 1(0.8) | 1 (0.8) | 0 (0.0) | 0 (0.0) | **2 (1.7)** |
| Lab tech | 1 (0.8) | 0 (0.0) | 1 (0.8) | 0 (0.0) | **2 (1.7)** |
| **Mortuary attendant** | 1 (0.8) | 1 (0.8) | 0 (0.0) | 0 (0.0) | **2 (1.7)** |
| **Total per** Exposure (%) | **48 (40.0)** | **35 (29.2)** | **34 (28.3)** | **3 (2.5)** | **120 (100.0)** |

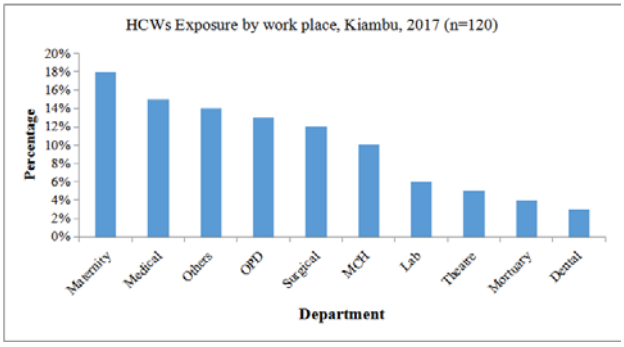


**Figure 3.** Distribution of exposure by work station, Kiambu County, 2017 (n=120)

Analysis of prevalence of exposure by site showed that the part of the body commonly exposed was hand, 95 (79.2%) (Table 5).

**Table 5. Frequency of exposure by site (n=120)**

| Site of exposure | Frequency | Percent |
|---|---|---|
| Hand | 95 | 79.2 |
| Mouth/Eyes | 16 | 13.3 |
| Leg | 9 | 7.50 |
| **Total** | **120** | **100.0** |

Results on the analysis of Distribution of sharps/needle sticks injuries by depth of penetration showed that twenty two (45.8%) sharp/needle injuries penetration were found to be deep (Table 6).

**Table 6. Distribution of needle/sharps injury by depth of penetration, Kiambu, 2017 (n=48)**

| Depth of injury | Frequency (n=48) | Percent (%) |
|---|---|---|
| Deep | 22 | 45.8 |
| Superficial | 26 | 54.2 |
| **Total** | **48** | **100.0** |

## 3.3. Factors Associated with HCWs Occupational Exposure to HIV

Factors associated with HCWs occupational exposure to HIV were analysed using bivariate analysis. The results showed that being a medical doctor (OR 2.9; 95% CI: 0.1-0.9) and ≤ 5years work experience (OR 2.1; 95% CI: 3.3-3.4) were associated with HIV exposure while being married (OR 0.6; 95% CI: 0.4-0.95) was a protective factor (Table 7).

**Table 7. Factors associated with HCWs occupational HIV exposure, Kiambu, 201 (n=292)**

| Variable | | Exposed n (%) | Not exposed n (%) | cOR | 95% CI | p-value |
|---|---|---|---|---|---|---|
| **Sex** | **Female** | 67 (55.8) | 99 (57.6) | ref | | |
| | **Male** | 53 (44.2) | 73 (42.4) | 1.1 | 0.7-1.7 | 0.8 |
| <25 | | 15 (12.5) | 19(11.1) | ref | | |
| 25-34 | | 65 (54.2) | 81 (47.1) | 1.0 | 0.48-2.2 | 0.5 |
| 35-44 | | 23 (19.2) | 43 (25.0) | 0.7 | 0.29-1.6 | 0.4 |
| 45-49 | | 7 (5.8) | 11 (6.4) | 0.8 | 0.25-2.6 | 0.7 |
| >50 | | 10(8.3) | 18 (10.5) | 0.7 | 0.25-2.0 | 0.5 |
| Clinical | | 92 (76.7) | 135 (78.5) | ref | | |
| Non-clinical | | 28 (23.3) | 37(21.5) | 0.9 | 0.5-1.6 | 0.7 |
| **Cadre** | | | | | | |
| Cleaner | | 23 (54.8) | 32 (78.0) | ref | | |
| **Doctors** | | **19 (45.2)** | **9 (22.0)** | **2.90** | **0.1-0.9** | **0.02*** |
| Clinical officers | | 7 (23.3) | 16(33.3) | 1.64 | 0.6-4.6 | 0.35 |
| Nurses | | 39 (62.9) | 69 (68.3) | 0.80 | 0.4-1.5 | 0.48 |
| Lab technologists | | 2 (8.0) | 8 (20.0) | 2.90 | 0.6-1.5 | 0.19 |
| Dentist | | 2 (8.0) | 5 (13.5) | 1.80 | 0.3-10.1 | 0.50 |
| Interns | | 23 (50.0) | 28 (46.7). | 0.86 | 0.4-1.9 | 0.73 |
| VCT counsellors | | 3(11.5) | 3 (8.6) | 0.72 | 0.1-3.9 | 0.70 |
| Mortuary attendants | | 2 (8.0) | 2 (5.9) | 0.72 | 0.1-5.5 | 0.70 |
| **Marital status** | Others | 63 (52.5) | 111 (64.0) | ref | | |
| | **Married** | **57 (47.5)** | **61 (35.4)** | **0.6** | **0.4-0.95** | **0.05*** |
| **Work station** | Outpatient | 41 (36.8) | 76 (52.8) | ref | | |
| | Inpatient | 62 (60.2) | 68 (47.2) | 1.7 | 1.0-2.8 | 0.6 |
| Total years worked | >5years | 44 (36.8) | 95 (55.2) | ref | | |
| | ≤5 years | 76 (63.3) | 77 (44.8) | 2.1 | 3.3- 3.4 | 0.002 * |

*significantly different at 5% level of significance

Factors that had a p-value of >0.20 (medical doctor p-value 0.02 and total years worked p-value 0.002) were modelled using a logistic regression model. Both factors remained significant predictors for exposure to HIV, medical doctor (aOR 4.6; 95% CI: 1.6 - 12.6) and work experience <5 years (aOR 2.2; 95% CI: 1.0 - 5.2) (Table 8).

**Table 8. Logistic regression for factors associated with HCWs exposure to HIV**

| Variable | aOR | 95% C.I | p-value |
|---|---|---|---|
| Medical doctor | 4.6 | 1.6 -12.6 | 0.005 |
| ≤ 5 years work experience | 2.2 | 1.0 - 5.2 | 0.05 |

**Table 9. Factors associated with PEP uptake, Kiambu, 2017, (n=292)**

| Variable | | PEP n (%) | No PEP n (%) | cOR | 95%C.I | P-value |
|---|---|---|---|---|---|---|
| Sex | Female | 21 (48.8) | 46 (59.7) | ref | | |
| | Male | 22 (51.2) | 31 (40.3) | 0.64 | 0.3-1.4 | 0.25 |
| Age | <25 Yrs. | 4(14.80) | 11 (20.8) | ref | | |
| | 25-34 | 23 (85.8) | 42 (79.3) | 1.51 | 0.4-5.3 | 0.42 |
| | 35-35-44 | 13 (76.5) | 10 (47.6) | 3.6 | 1.9-14.7 | 0.07* |
| | 45-49 | 2(33.3) | 5 (31.3) | 1.1 | 0.2-8.1 | 0.9 |
| | >50 | 1 (20.0) | 9 (45.0) | 0.3 | 0.03-3.2 | 1.04 |
| Time of exposure | Night | 66 (68.8) | 11 (45.8) | ref | | |
| | Day | 30 (31.3) | 13 (54.2) | 0.4 | 0.2-0.9 | 0.04* |
| Marital status | Others | 24 (55.8) | 33 (42.9) | ref | | |
| | Married | 19 (44.2) | 44 (57.1) | 0.6 | 0.3-1.3 | 0.17 |
| Work station | Outpatient | 68 (89.6) | 8 (10.4) | ref | | |
| | Inpatient | 35(18.6) | 8(18.6) | 0.5 | 0.2-1.5 | 0.20 |
| Department | Non-clinical | 8 (16.0) | 20 (26.0) | ref | | |
| | Clinical | 35(81.4) | 57(62.0) | 1.5 | 0.6-3.9 | 0.36 |
| Cadre | Cleaner | 6 (37.5) | 17(65.4) | ref | | |
| | Doctors | 10(62.5) | 9(34.6) | 3.2 | 0.1-1.2 | 0.1 |
| | Clinical officers | 4 (40.0) | 3(15.0) | 0.3 | 0.1-1.5 | 0.1 |
| | Nurses | 39 (36.1) | 69 (63.9) | 1.6 | 0.6-4.4 | 0.4 |
| | Dentists | 1 (14.3) | 1 (5.6) | 0.4 | 0.02-6.6 | 0.5 |
| | Lab Technologists | 1 (14.3) | 1 (5.6) | 0.4 | 0.02-6.6 | 0.5 |
| | Interns | 7 (53.7) | 16(48.5) | 0.8 | 0.2-2.9 | 0.7 |
| | VCT | 1 (14.3) | 2 (10.5) | 0.7 | 0.1-9.3 | 0.8 |
| Total years worked | >5years | 26 (86.7) | 50 (89.3) | ref | | |
| | <5years | 4(13.3) | 6(10.7) | 7.8 | 0.2-3.0 | 0.1 |

*significantly different at 5% level of significance

### 3.4. Factors Associated with PEP Uptake

Factors associated with PEP uptake were analysed using bivariate analysis. The results showed that age 35-44 years was associated (OR 3.6; 95% CI: 1.9-14.7) with PEP initiation after occupational exposure while working during the day (OR 0.4; 95% CI: 0.2-0.9) was protective (Table 9).

Factors with p-value <0.20 (Age 35-44 years, p-value 0.07 and time of exposure P-value 0.04) were modelled using logistic regression. Age 35-44 (aOR 4.72; 95% CI: 1.0 - 23) was a factor found to be statistically significant for PEP uptake (Table 10)

**Table 10. Logistic regression on factors associated with PEP uptake**

| Variable | aOR | 95% C.I | p- Value |
|---|---|---|---|
| Age 35-44 years | 4.7 | 1.0 - 23 | 0.05 |

## 4. Discussion

This study sought to determine the prevalence of HIV exposure and uptake of PEP among health care workers in Kiambu and Thika hospitals, Kiambu County.It was determined that cadre and limited work experience are factors associated with HIV exposure while age is a predictor for PEP uptake.nAmong all HCWs interviewed, females were more than males. The highest number of HCWs interviewed were nurses while the least were mortuary attendants. This could be explained by the fact that nurses form the major occupational group as reported by other studies [15]. It was also found that about half of the study participants were trained on infection prevention and control. This is consistent with a previous study in Amhara Region, Ethiopia, [16].

The number of HCWs exposed to HIV was slightly less than half of the study participants. The overall prevalence of exposure was 41.1%. This was comparable to a study done in a semi-urban area in Mbeya Tanzania that reported a prevalence of 35% [17]. This also compares favourably with a study done in Northern Uganda Gulu hospital which found a prevalence of 46.0% [18] and North-Western Tanzania which reported a prevalence of 48.6% [19]. The highest number of HIV exposures were found to be in maternity ward. This could be explained by the fact that almost all the procedures undertaken here are high risk involving blood and blood contaminated materials. However, this disagrees with a study carried out in a similar environment in Rift Valley province, Kenya [20].

This study also found that of all exposures recorded, needle stick injuries were the highest (40%) and among the HCWs, nurses accounting for the highest proportion. This concurs with a cross sectional study which assessed HCWs from several health institutions in Georgia and found that needle stick injuries were at 45%, [21] and [22]. This could be explained by the fact that nurses are engaged in almost every department where high risk services are offered and their long hours of contact with patients. This finding contrasts with a similar study done in Serdang Hospital, Malaysia in 2010 [23]. It was found that 60% of HCWs reported exposure incidents. This is similar to a study carried out in Tanzania by [19]. However, it differs with a study earned out in Botswana, 2014 [24] and in Tanzania, 2015 [17]. The proportion (40%) that may not have reported probably could be due

to fear of possible HIV positive results and the associated stigma, ignorance or even fear of PEP side effects.

Intravenous line (15.8%) and blood collection (15.0%) were procedures that accounted for the highest number of exposures. This contradicts a study done in Kenya, 2011 [20]. This study, in concurrence with [25], revealed that the majority (86.7%) of HCWs wore personal protective equipment (PPEs) at the time of exposure. This also agrees with [20] who recounted that 98% of study participants wore PPEs during the time of exposure. The reason as to why may be the prevalence of exposure was high (41.1%) and especially needle stick injury even with PPEs could be explained by the fact that gloves and over coat garments may not provide full Protection against a needle injury. This study found that 35.8% of all exposed HCWs were initiated on PEP. This compares with a similar study carried out in South Africa that reported 37.0% PEP initiation [26]. Among these, 70.0% completed the PEP treatment course. This is in agreement with a study in Botswana 2014 which reported 71% PEP completion [24]. However, this is inconsistent with Mbeya study, Tanzania [17] which states that 23.0% of those exposed were issued with PEP and 39.0% of them completed the treatment course. Of the (64.2%) HCWs that were not initiated on PEP, they mentioned various reasons for not doing so like "source patient was HIV negative", "exposure not a risk" and "fear of side effects" among others. The reason mentioned the most (50%) was that the "source patient was HIV negative.This study found that PEP registers were incomplete and had inclusion of other types of exposures Non occupational) and therefore difficult to get tangible data that could relate with occupational exposures reported by the HCWs. This finding concurs with [20].

On factors of exposure, medical doctor and ≤5years work experience were found to be significant predictors associated with HIV exposure. This could be due to more risky and invasive procedures that doctors undertake as compared with other HCWs and the inexperience in work place by those who had not worked for longer than 5 years. This is in agreement with studies in Ethiopia, 2016 [25] and Tanzania, 2015 [19]. On factors of PEP uptake, age category 35-44 years was a significant factor for post exposure prophylaxis (PEP) uptake. This age bracket was almost 4 times more likely to take PEP after exposure than other ages. This could be explained by the fact that this age has work experience and knowledge on exposure, infection prevention and control.

## 5. Conclusion

In conclusion, this study found out that the prevalence of occupational exposure to HIV was high among HCWs, and common route of exposure in both hospitals was needle stick injuries. It was also concluded that not all HCWs initiated on PEP completed the treatment course. Doctors were shown statistically to have significant risk of exposure to HIV. The workers with experience ≤ 5 years were statistically shown to be more likely exposed HV than those who had work experience of >5 years. The age category 35-44 years was statistically significant factor which was associated with PEP uptake. The PEP registers were found to be inadequately filled having other types of exposures other than occupational. It was therefore recommended that regular health education on occupational risk at work place should be enhanced by the County and Hospital management teams including injection safety and follow-up on PEP uptake should be done by the health institutions to ensure that any HCW exposed and initiated on PEP adhered and completed the treatment course.

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