FACTORS INFLUENCING USE OF POST EXPOSURE PROPHYLAXIS AMONG HEALTH CARE WORKERS AFTER OCCUPATIONAL EXPOSURE TO HUMAN IMMUNODEFICIENCY VIRUS, MBEYA REGION, TANZANIA, 2009

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FACTORS INFLUENCING USE OF POST EXPOSURE PROPHYLAXIS AMONG HEALH CARE WORKERS AFTER OCCUPATIONAL EXPOSURE TO HIV, MBEYA REGION, TANZANIA, 2009

By

Marcelina Mponela

A dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Applied Epidemiology of Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned, certify that they have read and hereby recommend for examination of dissertation entitled ***Factors influencing the use of Post Exposure Prophylaxis among Health care workers after occupational exposure to HIV in Mbeya, Tanzania,*** in fulfillment of the requirements for the degree of Master of Science in Applied Epidemiology of the Muhimbili University of Health and Allied Sciences.

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:

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I, **Mponela Marcelina**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature.....Mponela..... Date...21/10/2010...

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DEDICATION

I would like to dedicate this study to my late beloved grandmother Anzelwise Kaduma, for her tender love and great care given to me which have made my life to be more meaningful today.

ABSTRACT

Background: Occupational exposure to blood or other body fluids in healthcare settings constitutes a small but significant risk of transmission of the Human Immune deficiency Virus (HIV) to Health Care Workers (HCWs). It is estimated that up to 1000 HIV infections are transmitted annually to HCWs worldwide. Tanzanian HCWs experience one to nine needle stick injuries (NSIs) per year, yet use of post-exposure prophylaxis (PEP) to reduce the risk of HIV transmission is undocumented. Use of PEP reduces the rate of HIV infection from workplace exposures by 81%. To better understand this phenomenon the factors influencing use of PEP among HCWs after occupational exposure to HIV were assessed.

Methods: A cross-sectional study was conducted in Mbeya referral hospital, Mbozi and Mbarali District hospitals from December 2009 to January 2010. A structured questionnaire was administered to HCWs at risk of exposure to body fluids and NSIs. Participants were randomly selected from a list of eligible HCWs in these hospitals. Data were analysed using Epi Info version 3.5.1. Stepwise logistic regression was used to evaluate factors associated with PEP use.

Results: A total of 291 HCWs participated in the study with 19.2% non-response proportion. Out of 291 HCWs, 102 (35.1%) were exposed to body fluids, of which needle stick injuries accounted for 62.7% (94/150). Prevalence of exposure was high among medical attendants 38.8 % (33/85). Out of exposed HCWs, 23/102 (22.5%) used HIV PEP; with females more likely to use PEP than males (1:2, M: F). Reporting of exposures (AOR=21.1, CI=3.85-115.62), and having PEP knowledge (AOR =6.5, CI=1.78-23.99) were significant factors for PEP use. However, working departments, type of injury, age, educational level and accessibility of PEP service were not statistically significant in this study.

Conclusion and recommendations: Despite the high rate of occupational exposure to HCWs in Tanzania, use of PEP is still low even though PEP drugs were available. Reporting of occupational exposures and having PEP knowledge were the factors influenced use of PEP among HCWs. Given the shortage of HCWs in Tanzania, effective prevention against HIV

infection in work places is required with proper training of HCWs on PEP and emphasis on timely reporting of exposures. Efforts to reduce rate of NSIs among HCWs should be conducted routinely in hospitals.

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LIST OF ACRONYMS/ABBREVIATION

AFENET	African Field Epidemiology network
AIDS	Acquired immunodeficiency syndrome.
AOR	Adjusted Odds ratio
ARV	Anti-retroviral drugs
AZT	Zidovudine
BBP	Blood borne pathogen
CDC	Centre for Disease Control and Prevention
DMO	District Medical Officer
EFV	Efavirenz
HBV	Hepatitis B
HCV	Hepatitis C
HCW	Health care worker
HIV	Human Immunodeficiency Virus
IHCS	International Health care worker safety centre
ILO	International labour organization
IPC	Infection prevention and control
MMWR	Morbidity and mortality weekly report
MO	Medical Officer
MOHSW	Ministry of Health and Social Welfare
MUHAS	Muhimbili University of Health and Allied Science
NACP	National AIDS Control Programme

NBS	National bureau of statistics
NSIs	Needle sticks injuries
RHMT	Regional health management team
RMO	Regional Medical Officer
THMIS	Tanzania HIV/AIDS and malaria indicator survey
TFELTP	Tanzania Field Epidemiology and Laboratory Training Program
UNAIDS	United Nations programme on HIV/AIDS
VL	Viral load

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Occupational exposure to blood and other body fluids in healthcare settings constitutes a small but significant risk for transmission of Human Immunodeficiency Virus (HIV) and other blood-borne pathogens (MMWR, 2001). These exposures can cause tremendous anxiety, fear and stress among healthcare workers (HCWs) with negative impact to HCWs and their families (Dufresne *et al*, 1998). The first report of a health care worker to be infected with HIV was published in the medical literature in 1984 (Lancet, 1984). The report launched a new era of concern for occupational transmission of blood-borne pathogens.

The World Health Organization (WHO) estimates that 3 million percutaneous exposures occur annually among 35 million HCWs globally, with over 90% occurring in resource-constrained countries (Pruss-Ustun et *al*, 2005). As a consequence of these exposures, it is estimated that up to 1000 HIV infections are transmitted annually to HCWs (IHCS, 1999).

Protecting HCWs in developing countries, where basics of medical care are difficult to provide and protection of HCWs does not appear on any list of health care priorities is a great challenge. Although the prevalence of blood-borne pathogens in many developing countries is high, documentation of infections caused by occupational exposure in these countries is scarce. Seventy percent of the world's HIV-infected population live in sub-Saharan Africa, but only 4 % of worldwide cases of occupational HIV infection are reported from this region (UNAIDS, 1999 and Ippolito *et al*, 1999). By contrast, only 4 percent of the world's HIV-infected population lives in North America and Western Europe, yet 90 percent of documented occupational HIV infections are reported from these areas (WHO, 2005). This observation suggests serious underreporting of occupational exposure cases from African region including Tanzania. There may be many reasons for underreporting of occupational HIV exposures and risky events including absence of active surveillance systems. The present deficiency in

occupational exposure to HIV data, results into lack of preventive measures to exposed workers and subsequent care to infected individuals and their families.

Currently, there are two known means to reduce the risk of developing HIV infection following exposure to HIV. These are post exposure prophylaxis (PEP) and interventions to prevent mother to child transmission. Several studies have demonstrated that PEP reduces the rate of HIV infection from workplace exposures by 81 %(CDC, 2001).

PEP has been a standard procedure to minimize risk of infection among HCWs exposed to HIV since 1996. Exposed workers start medications within 2 hours after exposure and not later than 72 hours. Usually the exposure can be percutaneous injury (e.g. needle stick injury or cut with a sharp object on the skin), mucous membrane or non-intact skin exposure to blood or body fluids that occurs during the course of an individual's employment (WHO/ILO, 2007). The risk for occupational transmission of HIV varies with type and severity. There are factors associated with an increased likelihood of transmission including; deep (intramuscular) injury, injury caused by a device that enters blood vessel, injury with a hollow-bore needle and from a source patient with a high viral load (VL).

In Tanzania, the Ministry of Health and Social Welfare had implemented the HIV post exposure prophylaxis guideline since 2004 (MOH, 2004). For the HIV guideline to be effectively adhered to, the HCWs need to be aware and well trained in management of HIV occupational exposure. Availability and accessibility to drugs for HIV PEP is one of the key components of HIV PEP service among HCWs. Despite of this guideline, there is little or no record of occupational exposure to HIV probably attributed poor mechanisms of reporting such exposures, additionally there is no proper documentation showing the extent to which HCWs utilize PEP after being exposed as a measure of controlling HIV infection at the work place. Therefore this study was done to assess factors influencing PEP use among HCWs as one measure to minimize the risk of acquiring HIV infection among HCWs.

1.2 Problem Statement

Exposure to HIV infection among HCWs, can be reduced by a number of preventive measures which include; use of disposable supplies such as disposable needles and syringes, observation of personal hygiene, use of personal protective equipments, careful and appropriate handling of sharps and patients, proper decontamination of surgical and medical instruments including their sterilization as well as the use of Post Exposure Prophylaxis (PEP) which can reduce HIV infection by approximately 81% when it is properly adhered to (CDC, 2001).

Each day thousands of people around the World experience accidental exposure to blood and other body fluids or tissues while performing their medical duties (WHO, 2005). HCWs are particularly more vulnerable because they face a dual risk, firstly due to their occupation and secondly due to their ordinary social life style. The potential for work place accidents that expose workers to HIV infected blood and other body fluids is increasing which justifies the need for PEP among HCWs. Several factors contribute to increase risk of occupational HIV exposure such as; increasing number of people living with HIV infection and use of anti retro viral medications (ARVs) which prolongs lives as a result more people with HIV are coming into contact with health care services.

A study conducted in fourteen hospitals in Tanzania by Manyele *et al*, to assess current status of occupational health and safety among HCWs revealed that needle stick injuries accounted for the largest part of accidents (52.9%) followed by splash of blood from patients (21.7%) . The major hazardous activities observed were venopucture, dressing of wounds, and surgical operations. Another study done in Mwanza Tanzania by Gumodoka *et al*, showed on average, a health worker is pricked five times and being splashed nine times per year and annual occupation risk of HIV transmission was estimated at 0.27% while for a health worker and surgeons had higher risk than other health workers.

Despite the high risk of HIV exposure to HCWs as shown in the studies above coupled with the presence of PEP guideline since 2004, little was known about PEP use by HCWs in

Tanzania. Moreover the researcher was not aware of any documented study executed in Mbeya region of Tanzania to assess the use of PEP services among HCWs. Therefore this study was done to assess factors influencing the use of PEP among HCWs in Mbeya region.

1.3 Rationale

Mbeya Region is one of the 21 regions of Tanzania with high prevalence of HIV/AIDS, which is approximately 9.2% (THMIS, 2007/2008). Increase in number of people living with HIV/AIDS places HCWs at higher risk of becoming infected with HIV as a result of their occupation. Again, there was a need to assess the current status of PEP use and the associated factors influencing use of this service among HCWs in Tanzania.

The obtained results from the study will inform policy makers and improve their understanding on the factors influencing uptake of PEP as well as serve as an important tool in controlling HIV infection among HCWs. Furthermore it was expected that, this study could guide hospital Management teams in improving PEP services among HCWs and encourage them to report and keeping record of occupational exposures in their work places. Additionally, this study was a partial fulfilment of the requirements for the award of Masters of Applied Epidemiology degree of Muhimbili University of Health and Allied Sciences.

1.4 Research Questions

1. What was the extent of PEP use after occupational exposure among HCWs in three hospitals (Mbeya referral hospital, Mbozi District hospital and Mbarali District hospital)?
2. Which factors influenced PEP use after occupational exposure to HIV among HCWs?

1.5 Objectives

1.5.1 Broad Objective

To assess factors influencing use of PEP after occupational exposure to HIV among HCWs in Mbeya region.

1.5.2 Specific Objectives

- To determine proportion of HCWs who experienced occupational exposure to HIV twelve months before the study.
- To determine proportion of HCWs who received PEP services after occupational exposure to HIV in the last twelve months.
- To assess level of knowledge on HIV PEP service among HCWs in selected Hospitals of Mbeya region
- To assess accessibility of PEP services among HCWs in selected hospitals of Mbeya region

CHAPTER TWO

2. LITERATURE REVIEW

Persons who care for patients and professionals or otherwise who work in health care facilities are at risk of exposure to blood borne pathogens (BBP) such a hepatitis B (HBV), hepatitis C (HCV) and HIV. The risk can be the result of needle stick or other sharps injuries and exposures arising from splashes of contaminated blood or body fluids onto mucous membrane or non-intact skin. HCWs incur more than 2 million needle stick injuries per year (Susan *et al* 2004). A report by WHO (2002) estimated that for the global burden of disease arising from occupational exposure, 40% is attributed to HBV and HCV, while 2.5% is attributed to HIV infections among HCWs.

Data from injection safety surveys conducted by the World Health Organization (WHO) and others shows that there is an average of four needle stick injuries per worker per year in Africa, Eastern Mediterranean and Asian Populations (Willburn and Eilkemans 2004). In Tanzania, HCWs experienced between 1-9 needles stick injuries per year (Larsen, 2000).

Many injuries occurring among HCWs are not reported especially in developing countries. While 90% of occupational exposures occur in developing World, 90% of reports of occupational infection occur in United States of America (USA) and Europe (Susan *et al*, 2004). Worldwide, estimated 40%-80% occupational exposures among health care workers are unreported (Makary 2007, Shiao 1999, Roy and Robillard 1995) as a result the magnitude of the impact of occupational exposures is not yet recognized. Workers may not report sharps injuries or splash exposures for number of reasons including; firstly they do not perceive the incident to carry a risk, secondly there are no program for PEP follow up and prophylaxis or the worker does not know about it, thirdly they fear retribution or firing and fourthly they do not want to be tested for HIV because of subsequent stigmatization or simply fear. However,

workers may have reasons other than the four listed above. A study done in Western Turkey to determine the rate of blood borne infections after needle stick and sharp injuries in nurses at work revealed that most nurses (69.1%) did not report any detail of their injuries (Ayranci and Kosqeroqlu ,2004).

In June 2001, 57 confirmed and 137 suspected cases of occupational HIV transmission in USA were reported by CDC (CDC, 2003). A study done in German at University Hospital of Frankfurt to measure prevalence of HBV, HCV and HIV in patients and related risk factors for occupational exposure among HCWs, the data showed HBV, HCV and HIV prevalence were 5.5%, 5.8% and 4.1% respectively, and department of internal medicine had the highest risk of acquiring blood borne infection (Wicker, 2008). This showed the importance of HIV PEP for HCWs. A study done in Taiwan to determine yearly incidence and causes of sharps injuries in health care workers revealed that reported incidence of needle stick and other sharps was 1.3 and 1.21 per year per person. Additionally, it was shown that of needles that stuck health care workers 54.8% had been used in patients, 8.2% of whom were known to have hepatitis B or C, syphilis or HIV (Guo *et al*, 1999). In South Africa, 91% of junior doctors reported sustaining a needle stick injury in the previous 12 months, and 55% of these injuries came from source patients who were HIV-positive (Rabbits, 2003)

Studies have shown that, use of PEP in most developed countries is higher compared to developing countries. A study done in Rio de Janeiro reported 9.442 exposures, 4.730 (50.1%) HCWs were initiated PEP. The most common prescribed combination used was ZDV/3TC and the most frequent type of exposure was percutaneous injury (Mendes *et al*, 2002).

Studies that have been conducted in developing countries on utilization of PEP among HCWs shows there is low reporting of occupational injuries which explains the low uptake of PEP among HCWs. Evaluation of HIV PEP was done in Malawi found that only 29 HCWs reported injuries and among them 19 started PEP, but the attendance of schedule follow up was reported to be poor. There was high incidence of occupational injuries but many didn't

report for advice about PEP, mostly because of not being aware of the existence of PEP service and their reluctance to be tasted for HIV (Van Oosterhout, 2007).

A study conducted in Kenya (Thika district) revealed that the incidence of needle stick injuries to be 0.97 per worker per year; and when uptake of hepatitis B vaccination was compared to uptake of PEP, 80% of staff acquired vaccination but out of 68% of staff who recalled to have experienced needle stick injuries (NSIs), only 4% used PEP. The common reasons were fear to HIV testing and low perception of NSIs (Taegtmeyer *et al*, 2003). Also another study done at Mulago hospital in Uganda showed that, out of 107/129 (82.9%) of staffs exposed to infectious material only 28% sought advice on PEP. The main reasons for low use of PEP were inadequate PEP knowledge and perception of needle stick injury as a low risky exposure (Rose Alenyo *et al*, 2009).

In Tanzania, PEP guidelines (the National Infection Prevention and control guideline for Health care services in Tanzania and case management of HIV/AIDS) for HCWs have been implemented since 2004. This guideline stipulates steps to be taken when a health worker is accidentally injured and/or exposed to HIV infection using the WHO emergency (PEP) approach. In these guidelines they have clearly defined what PEP means, common procedures which present a risk of exposure, roles of clinicians responsible for PEP, factors influencing the risk of exposure, steps to follow once HCW is exposed to blood and other body fluids (treatment of exposure site, report and document, evaluation of exposure, evaluation of exposure source, provision of ARVs and follow up of exposed HCW). Roles of health facility management to ensure better provision of PEP service have been also stipulated which are; first to assign one person responsible for PEP and state clearly the procedures that HCW should follow immediately after exposure, second is that all staff including cleaners should be given information to ensure they know about PEP, third is to ensure PEP service is available for all 24 hours of each day including weekdays, fourth; when the responsible person for PEP is off duty, he should inform the person who replaces him or her with proper procedure, fifth is to ensure drugs are always accessible by the person responsible for PEP and last they should guarantee confidentiality (IPC, 2007 and NACP, 2008).

But despite of all these procedures, there is no any report or document showing number of reported injuries and HCWs who have used PEP after being exposed to HIV at their workplaces.

CHAPTER THREE

3. METHODOLOGY

3.1 Study Area

Mbeya Region comprises of 8 districts which are; Chunya, Mbarali, Mbozi, Rungwe, Kyela, Ileje, Mbeya urban and Mbeya rural. The total area of the region is about 63,617sq.km. Mbeya is bordered by Iringa region to the east, Rukwa region to the west, Tabora region to the northwest, Singida region to the northeast and neighbouring countries of Zambia and Malawi to the south .The total population of Mbeya region is estimated to be 2,581,792 people (NBS, 2006). HIV prevalence of Mbeya region is 9.2% (THMIS, 2008). The region has several health care facilities including 8 District hospitals, a Regional hospital and a referral hospital which is situated in Mbeya urban.

3.2 Study Design

This was a cross sectional study which was conducted in three selected hospitals in Mbeya region between December 2009 and January 2010. A quantitative approach was employed and a structured questionnaire was used to collect information regarding experience of HCWs to occupational exposure and influencing factors that determine their PEP use.

3.3 Study Population

All HCWs who were at risk of being exposed to infectious materials (e.g. blood, tissue, and specific body fluids or equipment, or environmental surfaces contaminated with these substances) in their work place were eligible to the study. These include; specialist Doctors, clinicians (Medical doctors, assistant medical officers, clinical officers), Dental personnel, laboratory personnel (laboratory assistants, laboratory technicians and laboratory scientists) autopsy personnel, Nurses (enrolled nurses, nurse midwives, registered nurses and nurse officers), medical attendants and cleaners.

3.4 Sample Size

A total sample size of 360 of HCWs from the three hospitals was required, and it was obtained from the following formula;

$$N = \frac{Z^2 P (1-P)}{\varepsilon^2}$$

Where;

N-sample size

Z-significant level at 95% confidence interval which is 1.96

P-Proportion of HCWs with needle sticks injuries 52.9 % (Manyele *et al,* 2008)

ε -Marginal error at 5%

Therefore;

$$N = \frac{(1.96)^2 \times 0.5 \times 0.471}{(0.05)^2}$$

= 360 Health care workers

3.5 Sampling Procedure

Mbeya referral hospital (urban) and the district hospitals; Mbozi and Mbarali (rural) were selected by a stratified sampling technique from a sample frame of 8 districts hospitals regional hospital and Mbeya referral hospital. All eligible HCWs were selected and enrolled in all hospitals. In Mbeya referral hospital a total of 200 HCWs were required while in Districts hospital 80 HCWs in each hospital were required. The decision on how many HCWs to pick from each hospital was judgmental based on the number of HCWs available in these hospitals.

3.6 Data Collection and Procedures

3.6.1 Recruiting and training

Two research assistants were recruited and trained for two days. The training included objectives of the study, sampling methods, data collection procedures, importance of confidentiality and the necessary ethical procedures. Research assistants were also participated in the pre-testing of the research instruments.

3.6.2 Data collection tool and technique

i) A semi structured questionnaire (Swahili version) was used to interview the eligible HCWs in selected hospitals. The questionnaire consisted of four main parts which were; social demographic characteristics, experience to occupational exposure and use of PEP, accessibility of PEP service and knowledge of PEP service.

ii) An inventory checklist was used to determine the availability of ARV for PEP and guidelines related to HIV PEP.

3.6.3 Data collection procedure

Data were collected by the help of two research assistants. Before the interview, each participant was informed about the study and its objectives, confidentiality and freedom to participate in the study. After that, participants were asked for their consent. All responses were recorded in the already prepared questionnaires.

3.6.4 Pre testing of Questionnaire

Before the study, the questionnaire were pre tested at Mbeya regional hospital to check whether the questionnaire were understood, the sequence of the questions were logical and if there was a need to modify or restructure some of the questions.

3.7 Study Variables

3.7. 1 Dependent variable

- Use status of HIV PEP services among the selected health care workers.
-

3.7.2 Independent variables

- Gender
- Age
- Cadre
- Level of education
- Marital status
- Working department
- Type of injury
- Reporting of occupational exposures
- Accessibility of PEP services to HCWs.
- level of knowledge on HIV PEP service among HCWs

3.8 Operational definitions

Health care worker (HCW)

For this study, a HCW refers to a "paid or unpaid person working in health-care settings who has the potential of being exposed to infectious materials (e.g., blood, tissue, and specific body fluids and medical supplies, equipment, or environmental surfaces contaminated with these substances".

Occupational Exposure

Is a percutaneous injury (e.g. a needle stick or cut with a sharp object) or contact of mucous membrane or non intact skin (e.g. exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, tissue, or other body fluids that are potentially infectious occurring at the workplace.

PEP Use

This was based on the definition provided by national infection prevention and control guidelines for Health care service in Tanzania (pg 27) which is "the immediate provision of medication (ARVs) following an exposure to potentially infected blood or other body fluids in order to minimize the risk of acquiring infection". The drugs should be provided within 72 hours and recommended drugs for PEP are; for low risk HIV exposures, a combination of Zidovudine (AZT) and Lamivudine (3TC) should be used and for high risk exposures triple therapy should be used i.e. Zidovudine (AZT) +Lamivudine (3TC) and Efavirenz (EFV).

Level of Knowledge

In this study, level of HIV PEP knowledge was defined as what was known by the health care worker regarding the PEP use and all procedures to follow once a health care worker is exposed to body fluids as stipulated in the National infection prevention and control guidelines for healthcare services in Tanzania. The HCWs were asked 5 questions to test their level of knowledge on PEP. Each question was assigned the score depending on the weight of the question making the total score of 100. The scores were graded as follows

Question 24- 20 scores

Question 26- 25 scores

Question 27a- 12.5

Question 27b- 30 score

Question 28- 12.5 scores

The level of education was categorized into two categories i.e. those scored from 0-59 were graded as having "low knowledge" while those scored from 60-100 were graded as having "high knowledge".

Accessibility of PEP service

For the purpose of this study; Accessibility of PEP drugs is the easiness to access the drugs for PEP during weekends, holidays and night shift in case of emergency. This is according to national infection prevention and control guidelines on the roles of the health facility management to ensure better provision of PEP service to HCWs which are;

- To assign one person responsible for PEP.
- To ensure PEP service is available for all 24 hours of each day, including weekends.
- When the responsible person for PEP is off duty, all HCWs should be informed who replaces him/her.
- Ensure that PEP drugs are always accessible by the person responsible for PEP.

Based on these, HCWs were asked four questions to assess the accessibility of the service. Each question carried 2 scores making a total of 8 scores. The level of accessibility was categorized into two categories i.e. those scored 0-4 were grades as "low accessible level" and those scored from 5-8 were grades into "high accessible level".

3.9 Data Management and Analysis

Data were collected for two months by the investigator and two research assistants. Collected information was checked for completeness and other errors at the end of each data collection day. After completing data collection, coding of the data was done and then they were entered into the computer. This was followed by data cleaning checking for missing data, outliers as well as for illogical data. Analysis of the data was done by using EPI INFO software version 3.5.1. Initial descriptive analysis was performed to determine frequency distribution of participants by socio-demographic factors such as age, sex, education level, cadre, experience to occupational exposure and others. Then bivariate analysis was done to get the Statistical measures of associations (Odds ratios) between independent and dependent variables and statistical significance was assessed at 95% confidence interval. Lastly, multivariable logistic regression was used to identify the relationship between factors that were independently

associated with the use of HIV PEP. Factors those were significant in bivariate analysis at the $p < 0.05$ levels were considered in the final model.

3.10 Ethical Clearance

Ethical clearance was obtained from MUHAS Directorate of Research and publications. Permission to conduct the study was sought from the Mbeya Regional Medical Officer (RMO) and District medical Officers (DMOs) of Mbozi and Mbarali hospitals and the Director of Mbeya referral hospital. Informed consents were also received from HCWs before they could be enlisted to participate in the study. Confidentiality was ensured at all levels of data handling and management and codes rather than names were used. All participants were free to withdraw at any stage of the study.

3.11 Study Limitations

In doing this study, a number of limitations were encountered including; (1) Shortage of HCWs made access to available staffs to be difficult and this necessitated several visits before the study population could be achieved. (2) Recalling what happened over a year period may have been difficult for the participants and this may have introduced some element of recall bias. (3) Deliberate refusal to disclose exposure due to fear of HIV test may lead to under reporting of cases and exposures. (4) Low number of HCWs in Districts hospitals lead to get less number of HCWs compared to expected sample size i.e. Mbozi district hospital 69 out of 80 and Mbarali 39 HCWs out of 80 HCWs.

CHAPTER FOUR

4. 0 RESULTS

4.1 Social Demographic Characteristics of the Study Participants

A total of 291 out of 360 HCWs from three hospitals participated in the study with the response rate of 81% as follows; Mbeya referral hospital 191(65.6%), Mbozi District hospital 69(23.7%) and Mbarali District Hospital 31(10.7%). Of the study respondents 206/291(70.8%) were females. The mean age of the participants was 41.6 years (SD 9.82) with a range of 21-64 years. About 58% of the respondents were above 40 years of age. Age group 51+ years had highest percentage number of females (81.5%) compared to other groups. Majority of the respondents (81%) had been married at some point in life, more than half (53.2%) had higher education (college and university level of education), these included (97/155) 62.6% females and (58/155) 37.4% males. The highest frequencies of respondents were nurses (41.6%) followed by medical attendants (29.2%) as shown in **Table 1**. Of the respondents 37.5% were from conventional wards as shown in **Table 2**.

Table 1: Sex Distribution of Health Care Workers by Social Demographic Characteristics

Category	Female	Male	Total
Health facility			
Mbeya referral	125(65.4)	66(34.6)	191(65.6)
Mbarali	22(71.0)	9(29.0)	31(10.7)
Mbozi	59(85.5)	10(14.5)	69(23.7)
Age Group (years)			
21-30	30(53.6)	26(46.4)	56(19.2)
31-40	46(69.7)	20(30.3)	66(22.7)
41-50	86(74.8)	29(25.2)	115(39.5)
51+	44(81.5)	10 (18.5)	54(18.6)
Marital status			
Ever married	174(73.7)	62(26.3)	236(81.1)
Never married	32(58.2)	23(41.8)	55(18.9)
Education level			
Primary school	67(77.9)	19(22.1)	86(29.6)
Secondary education	42(84.0)	8(16.0)	50(17.2)
Higher education	97(62.6)	58(37.4)	155(53.2)
Cadre			
Clinicians	17(34.0)	33(66.0)	50 (17.2)
Nurses	105(86.8)	16(13.2)	121(41.6)
Lab. technicians	9(50.0)	9(50.0)	18 (6.2)
Medical attendants	69(81.2)	16(18.8)	85 (29.2)
Dental personnel	0(0.0)	5(100.0)	5 (1.7)
Cleaners	6(50.0)	6(50.0)	12(4.1)
Total	**206 (70.8)**	**85(29.2)**	**291(100)**

Table 2: Distribution of Health Care Workers by working duty station

Duty Station	Frequency	Percent
Casualty (OPD)	42	14.4
Dental	6	2.1
Laboratory	20	6.9
Maternity ward	33	11.3
Conventional wards	109	37.5**
Theatre	33	11.3
Others	48	16.5*
Total	**291**	**100**

*Others mean Mortuary, Laundry and environment supporting staffs.
**Conventional wards; Female ward, male ward, paediatric ward, surgical ward

Among the respondents about 58% had working experience of more than ten years, only 14.4% had working experience of a year and below where by 37/42 (19.4%) of those with working experience of one year and below were from Mbeya referral hospital, as **shown in Table 3**.

Table 3: Distribution of HCWs by working experience and hospital Mbeya, 2009

Health facility	Working experience (years)			
	0-1 (%)	2-10 (%)	>10 (%)	Total
Mbeya referral	37(19.4)	33(17.3)	121(63.4)	191(65.6)
Mbarali	5(16.1)	13(41.9)	13(41.9)	31(10.7)
Mbozi	0(0.0)	35(50.7)	34(49.3)	69 (23.7)
Total	**42(14.4)**	**81(27.8)**	**168(57.7)**	**291(100)**

4.2. Experiences to Occupational Exposure

Out of 291 respondents who were interviewed 102/291 (35.1%) (95% CI 29.6%-40.8%) had experienced occupational exposure in the last twelve months. The prevalence of exposure was higher among medical attendants 33/85(38.8%) followed by nurses 44/121 (36.4%). Cleaners had low frequent of exposure 2/12 (16.7%) as shown in **Table 4**. The most frequency exposure was needle stick injury (62.7%) and the least exposure being cut with sharp objects (4.1%) as shown in **figure 1**. Dental personnel and nurses reported more incidents of occupational exposures compared to other cadres as shown in **Figure 2.**

Table 4: Experience to Occupation Exposure in the Past 1 Year by Cadre among Health Care Workers

	Exposed		
Cadre	**Yes (%)**	**No (%)**	**Total (%)**
Clinicians	15 (30.6)	34(69.4)	49(16.8)
Dental Personnel	2 (40.0)	3(60.0)	5(1.7))
Laboratory Technician	6 (33.3)	12(66.7)	18(6.2)
Medical Attendants	33 (38.8)	52(61.2)	85(29.2)
Specialist Doctor	0 (0.0%)	1 (100)	1(0.3)
Nurse	44 (36.4)	77(63.6)	121(41.6)
Cleaners	2 (16.7)	10(83.3)	12(4.1))
Total	**102 (35.1)**	**189 (64.9)**	**291(100)**

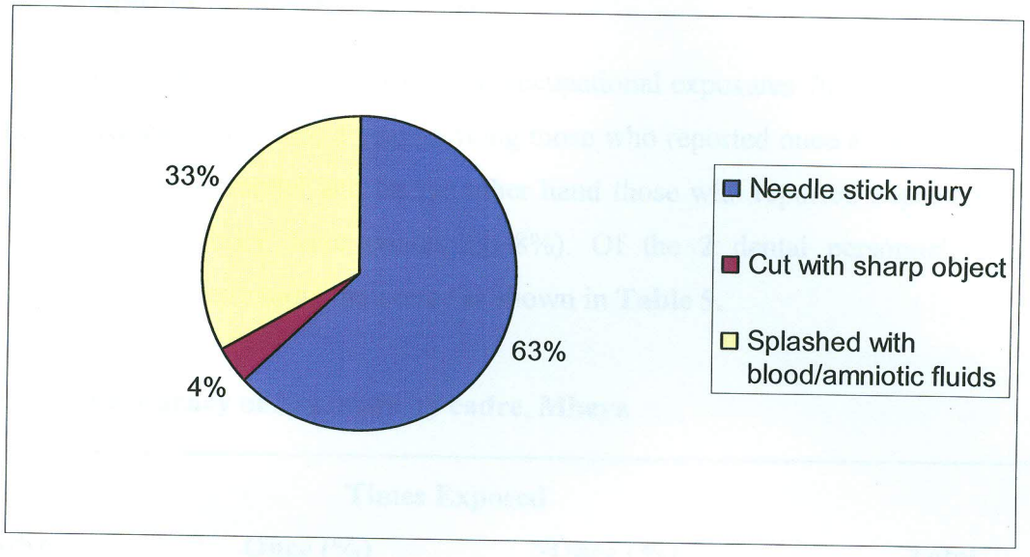


Figure 1: Type of Occupational Exposures Among health Care Workers

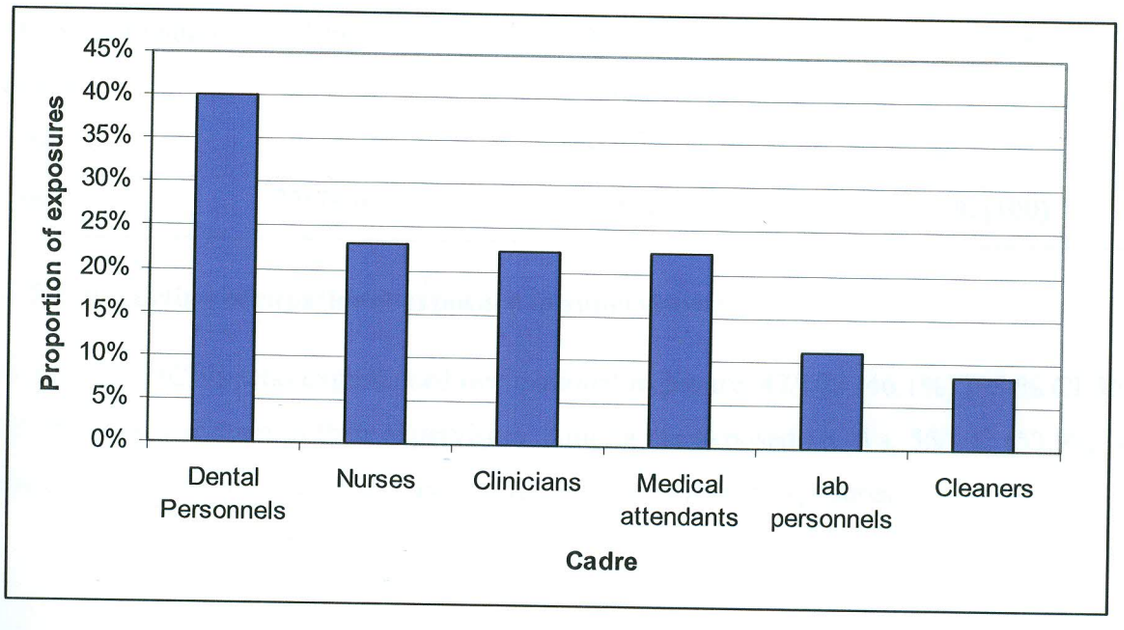


Figure 2: Frequency of exposure by cadre, Mbeya, 2009

4.2.1 Frequency of exposure by cadre

Out of 102 respondents who experienced occupational exposures 70.6% (72/102) experienced occupational exposure once a year. Among those who reported once a year exposure majority were laboratory personnel and on the other hand those who reported exposure of more than once a year, majority were nurses (31.8%). Of the 2 dental personnel, 1 experienced occupational exposure more than once as shown in **Table 5.**

Table 5: Frequency of Exposure by cadre, Mbeya

	Times Exposed		
Cadre	**Once (%)**	**>Once (%)**	**Total**
Clinician	11(73.3)	4(26.7)	15(14.7)
Dental personnel	1(50)	1(50)	2(2.1)
Lab. technician	5(83.3)	1(16.7)	6(5.9)
Medical attendant	23(69.7)	10(30.3)	33(32.4)
Nurse	30(68.2)	14(31.8)	44(43.1)
Cleaners	2(100.0)	0(0.0)	2(2.1)
Total	**72(70.6)**	**30(29.4)**	**102(100)**

4.2.2 Reporting occupational exposure to supervisors:

Out of 102 HCWs who experienced occupational exposure, 47/102 (46.1%) (95 % CI 36.2%-56.2%) reported them to their supervisors. Among the exposed HCWs, 55/102 (53.9%) knew the HIV status of the source of exposure for their most recent exposures.

4.3 Use of Post Exposure Prophylaxis

Out of 102 HCWs exposed only 23/102 (22.5%) (95% CI 14.9%-31.9%) used PEP after being exposed to occupational exposures. About 7/23 (30.4%) of those who used PEP knew the type of drugs given (which was Zidovudine and Lamivudine). Nurses and medical attendants were the most likely groups to use PEP (27.3%) each, followed by clinician as shown in **Table 6**. All HCWs who used PEP were given the drugs within 72 hours. Fourteen (60.9%) of HCWs who used PEP completed the four weeks dose. For those who didn't completed the dose, the reasons behind were; 22.2 %(2/9) forgot to take medicine, 22.2% got advised by Doctors, 44.4% (4/9) got side effects and 11.1 % (1/9) just ignored.

Table 6: Frequency of PEP use by Cadre among Exposed Health care workers

	PEP USE		
Cadre	**Yes (%)**	**No (%)**	**Total (%)**
Clinicians	2 (13.3)	13(86.7)	15(14.7))
Dental Personnel	0 (0.0)	2(100.0)	2(2.1)
Laboratory Technician	0 (0.0)	6(100.0)	6(5.9)
Medical Attendants	9 (27.3)	24(72.7)	33(32.4)
Nurse	12 (27.3)	32(72.7)	44(43.1)
Cleaners	0(0.0)	2(100.0)	2(2.1)
Total	**23 (22.5)**	**79 (77.5)**	**102(100.0)**

4.4 Level of Knowledge on HIV PEP Service among HCWs

Of the total respondents, 234/291(80.4%) had ever heard about HIV PEP services as **shown in figure 4**. Among those who had ever heard of PEP, 133/234 (56.8%) had actually got PEP training most of whom were clinicians 37/49 (75.5%) while medical attendants had the lowest prevalence to attend HIV PEP training 18/53 (34%)

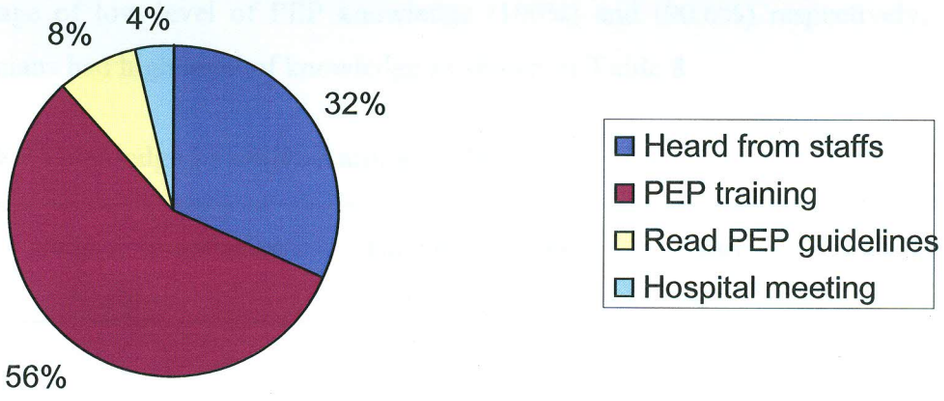


Figure 3: Source of HIV PEP information among HCWs, Mbeya

To assess level of HIV PEP knowledge, five questions were asked and scored based on the weight of the question and then two categories were obtained i.e. low knowledge and high knowledge categories. Of the total respondents interviewed 181/291(62.2%) had low HIV PEP knowledge in which HCWs from Mbozi district hospital had high prevalence with low PEP knowledge 61/69 (88.4%) and Mbeya referral hospital had high prevalence of HCWs with high PEP knowledge 89/191(46.6%) as shown in **Table 7.**

Table 7: Level of HIV PEP knowledge by hospital among HCWs, Mbeya

Hospital	Low knowledge N (%)	High knowledge N (%)	Total
Mbarali	18 (50.1)	13 (41.9)	31(10.7)
Mbozi	61 (88.4)	8 (11.6)	69(23.7)
Mbeya Referral hospital	102 (53.4)	89 (46.6)	191(65.6)
Total	**181 (62.2)**	**110 (37.8)**	**291(100)**

Based on the level of PEP knowledge within cadres, cleaners followed by medical attendants had highest percentage of low level of PEP knowledge (100%) and (90.6%) respectively, while (72%) of clinicians had high level of knowledge as shown **in Table 8**

Table 8: Level of PEP knowledge by cadre Among HCWs

Cadre	Higher knowledge N (%)	Low knowledge N (%)	Total N
Medical attendant	8(9.4)	77(90.6)	85
Cleaners	0(0.0)	12(100)	12
Clinician	36(72.0)	14(28.0)	50
Dental	2(40.0)	3(60.0)	5
Lab. technician	8(44.4)	10(55.6)	18
Nurse	56(46.3)	65(53.7)	121
Total	**110(37.8)**	**181(62.2)**	**291(100)**

4.5 Accessibility of PEP service among Health care Workers

Out of 291 respondents, 122(41.9%) revealed the availability of focal person responsible for provision of PEP services. In general Out of 291 respondents involved into the study 121(41.6%) were under the high accessibility of PEP service category while the rest were under the low accessibility category. About 51.3 %(98/191) of HCWs from Mbeya referral hospital were under the category of high accessibility of PEP service while only 14.5 % (10/69) of HCWs from Mbozi hospital were under this category **as shown in Table 9**.
Based on the checklist used to assess the availability of drugs, it showed that all hospitals store PEP drugs together with other antiretroviral drugs and PEP drugs were available in the past six months although recording of occupational exposures was not done. PEP guidelines were available in all three hospitals.

Table 9: Level of PEP Accessibility among Health Care Workers by Hospital

Hospital	**Low accessibility**	**High accessibility**	**Total**
	N (%)	**N (%)**	**N (%)**
Mbarali	18(58.1)	13(41.9)	31 (10.7)
Mbozi	59(85.5)	10(14.5)	69 (23.7)
Mbeya referral hospital	93 (48.7)	98(51.3)	191 (65.6)
Total	**170(58.4)**	**121(41.6)**	**291(100)**

4.6 Bivariate Analysis of factors influencing use of HIV PEP among HCWs

Bivariate analysis of factors influencing use of HIV PEP among HCWs including age, sex, level of education, type of injury, times of exposure, working experience, working department and knowing HIV status of the source patient, knowledge of PEP and accessibility of the service was done.

It was found that, reporting of exposures, sex, knowing HIV status of the source patient and PEP knowledge were statistically significant factors influencing use of PEP among HCWs in Mbeya region while age, level of education, marital status, working departments, times exposed and level of PEP accessibility were not statistically significant as shown in **Table 10**

Table 10: Bivariate analysis of factors influencing use of PEP

Variable	PEP USE Yes	PEP USE no	OR	95%CI	P-value
Sex					
Female	22	58	7.90	1.01-62.80	0.03*
Male	1	21			
Age					
≤ 30 years	3	15			
> 30 years	20	64	0.64	0.17-2.44	0.76*
Level of education					
1° and 2° education	10	39	0.79	0.31-2.00	0.07
Higher education	13	40			
Marital status					
Never married	3	14	0.71	0.18-2.67	0.86*
Ever married	20	65			
Type of injury					
Percutaneous	19	49			
Splashed by blood	4	30	2.90	0.90-9.37	0.11
Times exposed					
Once	20	52	3.50	0.94-12.69	0.09
>Once	3	27			
Reporting of exposure					
Reported	21	26	21.40	4.66-98.30	0.00
Not reported	2	53			
Working departments					
High risk department	8	24	1.22	0.46-3.27	0.89
Low risk department	15	55			
HIV status of source patient					
Known	18	37	4.08	1.41-13.24	0.02
Not known	5	42			
PEP knowledge					
High knowledge	16	25			
Low knowledge	7	54	4.90	1.80-13.51	0.00
Level of PEP accessibility					
Low accessibility	11	52			
High accessibility	12	27	0.50	0.19-1.22	0.19

*fisher exact test has been used
High risk department are Maternity wards, Theatre, surgical wards and laboratory
Low risk departments are other wards apart from those mentioned above

4.7 Multivariate Analysis of factors influencing use of HIV PEP among HCWs

Further analysis of those factors observed to be statistically significant in bivariate analysis was done by using multiple logistic regressions in order to control for potential confounders. The final model consisted of 3 factors that were significant while knowing HIV status of the source patient was not statistically significant and thus it was eliminated in the model as shown in **table 11**.

Table 11: Multivariate analysis/Multiple logistical regression final model

Variable	AOR	95% CI	P-value
Reporting (Yes/No)	21.10	3.85-115.62	0.0004
PEP knowledge (High/low)	6.54	1.78-23.99	0.0046
Sex(female/male)	22.41	2.25-223.56	0.0081

CHAPTER FIVE

5. DISCUSSION

This study was conducted in three hospitals situated in Mbeya region which are Mbeya referral hospital and two districts hospitals (Mbarali and Mbozi).The study showed that more than a half of HCWs recruited were from Mbeya referral hospital this is primarily because Mbeya Referral Hospital is the largest hospital which serves all people from four regions situated in southern highland of Tanzania which are Mbeya, Iringa, Rukwa and Ruvuma regions, thus the hospital has higher number of HCWs from different specialities. About 19% did not participated into the study, the reasons for non participation were; absence of HCWs by being in schools, off duty, annual and maternity leave also some refused due to the high work load contributed to low number of HCWs compared to number of population served in their hospitals.

The observed proportion of HCWs exposed to blood and other body fluids in the study is lower compared to other studies, for example a study done at Mulago Hospital in Uganda it was observed that out of 107/129 (82.9%) of staffs were exposed to infectious material (Rose Alenyo et al, 2009).The observed difference might have contributed by either recall bias since HCWs had to remember exposures occurred in the past one year or HCWs are more knowledgeable on Infection prevention control measures thus more exposures were avoided. The study also showed that, the most affected cadres were nurses and medical attendants. The higher risk to nurses and medical attendants is because these are groups of HCWs who are mostly staying with patients and involved in most hazardous activities. Several other studies have similar findings (Manyele *et al*, 2003, Kiertiburananakul *et al*, 2006). For example, the study done by Manyele in Tanzania to assess the status of occupational safety among health care service providers in hospitals showed most hazardous activities were carried out by nurses and medical attendants (Manyele *et al* ,2003). Activities so classified include; dressing wounds, injecting, cleaning, surgical operations, patients care and medication. Another study

done in Thai University in Thailand revealed that out of 820 episodes with occupational blood or body fluid exposures reported, nurses were the largest group at risk accounting for 27 % (Kiertiburananakul *et al*, 2006).

The study showed that of the exposures, needle stick injuries accounted for higher proportion followed by splashed by blood and other body fluids. Studies from Thailand, Tanzania and China showed similar results (Zhanq *et al*, 2009, Manyele *et al*, 2006, Kiertiburananakul *et al*, 2006). The possible reasons for the needle stick injuries (NSIs) to be the most common exposure are; overuse of injections and unnecessary sharps, lack of supplies (disposable syringes, safer needle devices, and sharps-disposal containers), lack of access to and failure to use sharp containers immediately after injection, inadequate or short staffing, recapping of needles after use, lack of engineering controls such as safer needle devices, passing instruments from hand to hand in the operating theatre, lack of awareness of hazard and lack of training (WHO, 2003). Also HCWs reported more NSIs because it was a significant exposure to them compared to other exposures which a number of HCWs perceived them as non risky exposures. On the average, 0.9 NSIs occurred per HCW per year. This average is smaller compared to data showed by other studies (Wilburn *et al*, 2004, Gumodoka *et al*, 1997). Example Data from injection safety surveys conducted by the WHO and others showed on average of four NSIs are occurring per worker per year in the African, Eastern Mediterranean, and Asian populations (Wilburn *et al*, 2004). Also other study done in Mwanza showed that on average a HCW is pricked five times per year (Gumodoka *et al*, 1997). This different might have been potentiated by time difference i.e. 1997-2009 where by HCWs are more knowledgeable on infection prevention control measures to take in their workplaces.

Use of PEP among HCWs in developing countries is still low compared to other developed countries. A study done in Thika District, Kenya documented a PEP uptake of 4% among HCWs who reported exposure to NSIs (Taegtmeyer et al, 2008). Also other study done at Mulago Hospital in Uganda to assess Knowledge, Attitude and Practices of Staffs towards

Post-exposure Prophylaxis for HIV infection showed that, out of 107/129 (82.9%) of staffs exposed to infectious material only 28% sought advice on Post exposure prophylaxis the possible reasons being inadequate knowledge on PEP and perceiving NSIs as low risky (Rose Alenyo et al, 2009). Although the percentage of PEP use observed in this study was a bit higher compared to that shown in the study done in Kenya mentioned above, PEP use is still low compared to other developed countries. For instance, in a study done in Greece out of 188 reported occupational exposures to HIV 89.9% had PEP (Vasileia Konte, 2007) also other study in Rio de Janeiro showed out of 9.4 reported exposures 4.7(50.1%) HCWs were initiated PEP (Mendes *et al*, 2002).

In this study, females were twenty two times more likely to use PEP than males. Although more than seventy percent of the study population were females, this finding is still statistically significant. Other Factors observed in this study to be statistically significant to influence the use HIV PEP among HCWs were reporting of occupational exposures and level of HIV PEP knowledge.

Many injuries occurring among HCWs are not reported especially in developing countries. While 90% of occupational exposures occur in developing World, 90% of reports of occupational infection occur in United States of America (USA) and Europe (Susan *et al*, 2004). An estimated 40%-80% of HCWs exposures are unreported in developing countries (Makary 2007, Shiao 1999, Roy and Robillard 1995). In the present study, more than 50% of HCWs exposed to occupational exposures did not report their exposures to their supervisors. Similar results were shown by Jagger that up to 50% of NSIs were not reported (Jagger, 2004). Workers may not report sharps injuries or splash exposures for a number of reasons including; they do not perceive the incident to carry risk, no program exists for PEP follow up and prophylaxis or the worker does not know about it, they fear retribution or firing and they are scared of a possible positive result due to stigma. However, workers may have reasons other than the four listed above.

In the study HCWs with high knowledge were more likely to use PEP than HCWs with low knowledge. Although 56.8% of HCWs attended PEP training mostly being clinicians, yet more than 60% of all HCWs had low level of PEP knowledge particularly medical attendants and cleaners. This implies that Training regarding PEP is mostly given to clinicians, nurses and laboratory personnel while medical attendants and cleaners have been forgotten despite of being involved into hazardous activities. Based on this, training to all HCWs including cleaners regarding PEP is required. This is one of objective which has been stated under Tanzania National HIV policy and the National IPC guidelines for Healthcare services in Tanzania which requires the management to ensure all HCWs are given information and that they know about PEP (National IPC Guidelines, 2007). Several studies have been done to assess level of PEP knowledge in different cadres and found PEP knowledge among HCWs is still inadequate. Studies done by J.Parra-Ruiz and Chen in assessing level of knowledge related to PEP among doctors found that, there was inadequate knowledge of PEP (J.Parra-Ruiz *et al*, 2004, Chen *et al*, 2001). Although these results differ with this study where among clinicians, those with high PEP knowledge had higher proportion compared to those with low PEP knowledge. This change may have been contributed by increased number of PEP training among these workers over the years.

In the study despite of the PEP drugs availability, accessibility of the service by HCWs was low. Although the National IPC Guidelines requires the health Facility management to assign one responsible person for PEP service to HCWs, only 41.9% of total HCWs revealed the availability of this person. This factor might hinder the accessibility of the service to these HCWs as observed in the study more than 50% of respondents had limited access to PEP service. Although this finding was not statistically significant in the study, this factor might have contributed to low use of PEP among HCWs as the limited access to the service might have contributed by the low level of HIV PEP knowledge among these HCWs which was observed to be higher in the study.

There are some limitations which were observed in doing this study which might have affected some results of the study. For example the recall bias in which HCWs had to remember the exposures occurred in a past one year might have lowered the proportion of exposed HCWs .Another limitation was fear to get tested for HIV and stigma which might have lead the HCWs not to disclose their exposure status as a result underreporting of exposures was observed.

There are some questions which have not been solved by this study which need further research. The possible area to be researched is to assess factors for poor reporting of occupational exposures among HCWs.

CHAPTER SIX

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study showed that about a third of HCWs experienced occupational exposure to blood and other body fluids. Nurses and medical attendants were more affected cadres in which NSIs accounted for 62.7% of all exposures with an average of 0.9 NSIs per HCW per year.

In the study, use of PEP has been observed to be low like other developing countries. Among the occupationally exposed HCWs 22.5% used PEP whereby nurses and medical attendants were cadres most likely to use PEP. All HCWs who used PEP, drugs were initiated the therapy within 72 hours but only 60.9% completed the treatment. The study has shown that, if one reports exposure has high knowledge and is a female is likely to use PEP.

In general, level of PEP Knowledge to Mbeya HCWs was low with high proportion to HCWs of Mbozi district hospital. Among cadres, the low level of PEP knowledge was observed among cleaners and medical attendants which was contributed by low frequency of attending PEP trainings.

In the study it was observed that, there was limited access to PEP service (58.4%) among HCWs, this is because of low provision of information to HCWs regarding the responsible person for PEP service and also due to low level of PEP knowledge.

6.2 Recommendations

1. All HCWs should be given education on Infection prevention control so that precaution measures can be taken and exposures at their work places can be reduced.
2. Hospital management teams should put much emphasis to HCWs on the importance of reporting all occupational exposures in order to increase rate of PEP use among HCWs.
3. MOHSW should provide HIV PEP training to raise overall knowledge of PEP use among all HCWs in these hospitals.
4. Proper follow up of HCWs who use PEP should be done to ensure they complete the treatment.
5. Hospital management teams should ensure that all HCWs, including medical attendants and cleaners get HIV PEP training regardless of their profession and level of education, this will enhance awareness of the services.
6. Hospital management teams should ensure they assign one responsible person for PEP provision to exposed HCWs and all HCWs should be informed to increase accessibility of the service.
7. All reported occupational exposures should be well documented for monitoring and evaluation of these exposures.
8. Hospital management teams should conduct daily supervision to all HCWs to ensure infection prevention controls measured are adhered to in order to reduce the rate of NSIs

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