

Exposure to Biological Hazards and Associated Factors  
among Health Care Workers in Public Hospitals of  
West Shoa Zone, Central Ethiopia

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A Thesis to be submitted to the Department of Health  
Services Management, Jimma University in Partial  
Fulfillment of the Requirements for the Degree of Master  
of Public Health in Health Services Management

October, 2013  
Jimma, Ethiopia

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## ABSTRACT

**Back-ground:** Occupational exposure to biological hazards is a serious concern for health care workers, and presents a major risk for the transmission of infections such as HIV and hepatitis viruses.

**Objective:** To assess the exposure to biological hazards and associated factors among health care workers in Hospitals of west Shoa Zone, central Ethiopia.

**Methods:** A cross-sectional study, involving **204** health care workers, was conducted in west Shoa zone from October 9/10/2013-30/10/2013. Purposive sampling was used for qualitative study but for the quantitative study all study populations were included. A pre-tested, self-administered structured questionnaire was used for quantitative data collection. Odds ratio with 95% confidence interval and binary logistic regression analysis were used to measure the degree of association between the dependent variable and the explanatory variables.

**Result:** About 31.8% and 65.7% of respondents sustained needle stick injuries and exposed to body fluids respectively within the last one year. The rate of needle stick injuries was also estimated at 1.95 injuries/ health care workers/year. Factors associated with occurrence of injuries were being a nurse (AOR=3.03, 95%CI=2.30, 10.4), attending many patients (AOR=2.07, 95%CI=1.35, 3.34), inconsistent use of personal protective equipments (AOR=2.23, 95%CI =1.25, 5.29) and recapping of used needles (AOR=2.34, 95%CI=1.78, 3.94) and not being trained on infection prevention(AOR=1.98,95%CI=1.46,4.77). Exposure to body fluids was also associated with being female(AOR=3.94,95%CI=2.09,7.40),age <30 years being (AOR=1.87, 95%CI=1.02,3.92),nurse(AOR=3.45,95%CI=1.22,9.8),not being trained on infection prevention(AOR=4.39,95%CI=1.98,9.70) and inconsistent use of personal protective equipments(AOR=2.79,95%CI=1.35,13.04).

**Conclusion:** Generally, the study showed that exposure to biological hazards during patient care among health care workers was high in the study area. So the management and the HCWs should take measure to minimize these problems, by giving training on infection prevention, by strengthening infection prevention committee, regular surveillance, availing adequate personal protective equipment, focus on immunization.

## **LIST OF ABBREVIATIONS AND ACRONYMS**

HCWs-Health Care Workers

PHC-Primary Health Care

HIV-Human Immuno Virus

HBV-Hepatitis B Virus

HCV- Hepatitis C Virus

CDC-Centers for Disease Prevention and Control

SPs-Standard Precaution

AIDS-Acquired Immuno Deficiency Syndrome

NSI-Needle Stick Injury

SPSS- Statistical Packages for Social Sciences

OSHA-Occupational Safety and Health Administration

WHO-World Health Organization

PEP-Post Exposure Prophylaxis

BBF-Blood and other Body Fluids

BBP-Blood Borne Pathogens

ABE-Accidental Blood Exposure

PCI-Percutaneous Injuries

PPE-Personal Protective Equipment

IP-Infection Prevention

OHS=Occupational Health and Safety

## **ACKNOWLEDGEMENTS**

I would like to present my heartfelt thanks to my God, the Lord of knowledge and wisdom, for his unlimited help and giving me peace of mind and capability to complete my thesis.

Next my deepest gratitude goes to my advisors **Dr. Mirkuzie Woldie** and **Mr. Negalign Birhanu** for their unreserved guidance and constructive comments in various aspects from the very beginning of the proposal development to this end.

I wish to express my appreciation to medical directors, department heads, head nurses and other staffs of the study facilities because their cooperation was very encouraging as well as I want to acknowledge the data collectors, supervisor and participants for their genuine dedication and participation during the study as well as **Nono woreda Health office** for the support of logistics and transportation cost for data collection.

At last not least, I would like to extend my thanks to Jimma University department of Health Services Management for providing me the opportunity to carry out this research paper development process.

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# **CHAPTER-ONE: INTRODUCTION**

## **1.1. Back-ground**

Health care workers (HCWs) are persons working in health care setting and they are potentially exposed to infectious materials such as blood, tissue, specific body fluids, medical supplies, equipment or environmental surfaces contaminated with these substances(1). They are frequently exposed to infectious agents through per- cutaneous injury such as needle stick or cut with sharps, contact with the mucous membrane of eyes or mouth of an infected person, contact with non intact skin exposed with blood or other potentially infectious body fluids(2).

Post exposure prophylaxis after a sharps injury reduces the incidence of infection for HBV and HIV, and if prophylaxis has been used, estimates of the incidence of infection after a sharps injury need to be reduced accordingly. Although the post-exposure efficacy of such a combination has not been evaluated in an occupational setting, it is presumed that it would be equally effective (3).

Health Care Workers (HCWs) are potentially exposed to infections while performing their duties. A standard precaution is regarded as an effective means of Protecting HCWs, patients, and the public, thus reducing hospital acquired infections. Standard precautions are designed to protect health care workers from being exposed to potentially infected blood and body fluid by applying the fundamental principles of infection prevention, through hand washing, utilization of appropriate protective barriers such as gloves, mask, gown, and eye wear. Standard precautions are also intended to protect the patient by ensuring that healthcare personnel do not transmit infectious agents to patients through their hands or equipment during patient care(4).

All health care employers must consider the health and safety of health care workers as well as the health and safety of those to whom they provide services. Action to limit disease transmission in clients is the major focal point of the work for infection prevention and control practitioners while the health and safety of the health care workers is the focus of Occupational Health and Safety (OHS) professionals. Exposures to biological hazards are most effectively controlled when everyone collaborates to limit disease transmission (5).Primary health care (PHC) and

community health care workers in most developing countries are not trained in the special needs of workers or in the simple measures that can be taken to prevent or overcome and control many workers' health problems (6).

Training and education ensure that all staff is aware of potential hazards and how to protect themselves and their coworkers through established policies and procedures(7).It is the responsibility of the health care organization to implement measures to prevent further transmission of infection, which sometimes warrants exclusion of personnel from work or patient contact (8).

## **1.2 Statement of the problem**

Making working conditions healthy and safe is in the interest of workers, employers and governments, as well as the public at large. Although it seems simple and obvious, this idea has not yet gained meaningful universal recognition. Hundreds of millions of people throughout the world are employed today in conditions that breed ill health and/or are unsafe (9).

Health care facilities around the world employ over 59 million workers who are exposed to many health hazards including biological, physical, chemical and psychological hazards. Each year, 3 million healthcare workers (HCW) are exposed to occupationally acquired infections in health care facilities (10).

The annual proportions of health-care workers exposed to occupationally acquired infections were 2.6% for HCV, 5.9% for HBV and 0.5% for HIV.In developing regions, 40%–65% of HBV and HCV infections in health-care workers were attributable to percutaneous occupational exposure. In developed regions, by contrast, the attributable fraction for HCV was only 8%–27%, and that for HBV was less than 10%, largely because of immunization and PEP. The attributable fraction for HIV in the various regions ranged between 0.5%–11percent (11).

According to World Health Organization (WHO) 2005 estimation 3 million percutaneous exposures occur annually among 35 million HCW globally; over 90% occurring in resource constrained countries. Health-care workers in Africa suffer two to four needle-stick injuries per year on average, with Nigeria, Tanzania and South Africa reporting 2.10 injuries per HCW on average. Each year as a consequence of

occupational exposure, an estimated 66,000 Hepatitis B, 16,000 Hepatitis C and up-to 1,000 HIV infections occur among HCWs. These infections are preventable through infection control measures which significantly reduce the risk of HIV and Hepatitis transmission among health workers (12).

Health care workers are at risk for occupational exposure to blood borne pathogens. Exposures occur through needle sticks or cuts from other sharp instruments contaminated with an infected patients' blood or through contact of the eye, nose, mouth, or skin with a patients' blood (13). Although standard precautions were established, their application is difficult in developing countries, owing to organizational problems and a lack of necessary materials such as gloves and proper needle-disposal facilities. Therefore since medical history and examination cannot reliably identify all patients infected with infectious agents, HCWs are exposed to biological hazards such as human blood and other body fluids (14).

As situational analysis conducted in 5 African countries in 2007, and 2009 country survey on policy practices conducted in 17 countries covering all WHO regions showed considerable gaps in the implementation of current policies, especially with respect to health workers' entitlements, rights, and access to HIV/TB prevention, testing and care. Also these studies showed that even when good policies exist at the national level, they do not always percolate to facility level as a consequence of lack of information, lack of resources for implementation, unclear or absent allocation of responsibility. In addition, the studies highlighted that health care workers are poorly protected against occupational transmission of HIV. For example, in some Sub-Saharan countries up to 68% of health care workers reported inadequate supplies of gloves, soap, and water and safety boxes (15).

Healthcare workers have an obligation to always follow specific established infection prevention and control policies as part of their contract of employment. This includes reporting their infectious status if it places others at risk as well as any known potential exposures to blood and/or body substances to be protected from different infections (16).

According to the WHO, HIV/AIDS increased burden to fragile health systems contending with inadequate infrastructure, resources, and workers. For example,

among female nurses in two hospitals in Zambia, deaths skyrocketed from 2 per 1000 in 1980 to 26.7 per 1000 in 1991. In Botswana, an estimated 17% of the health workforce died due to AIDS between 1999 and 2005 (17).

Successfully managing health and safety in the workplace relies on commitment, consultation and co-operation. Everyone in the workplace needs to understand the need for health and safety, what their role is in making the workplace safer, and how they can fulfill their responsibilities and duties (18). Kenyan health workers report that they are stretched dangerously thin as they deal with higher patient loads and increasingly complex cases. The HIV/AIDS epidemic has created a particularly challenging environment for managing attrition, absenteeism, workload, training, deployment, and retention of health care workers due to fear of exposure to biological hazards in hospitals(19).

Needle stick injury exposure among health care workers in African countries is higher than elsewhere and a significant public health issue. Similar studies in Ethiopia showed that 32% of the needle stick injuries were reported in the Sidama zone and 31% in northwestern Ethiopia (20).

The study in Hareri regional state shows that 20.2% of the HCWs had blood splashes and body fluids to the eyes. A total of 17.5% of the HCWs had needle stick injuries and 13.5% were cut with sharp instruments. Post exposure prophylaxis (PEP) protocols were uncommon in the health care workplaces (38.9%); most hospital staff (74.5%) reported PEP availability. The leading activity that exposes HCWs to NSIs was the recapping or disposal of the needle (21).

A healthy and motivated workforce is fundamental to the future social and economic wellbeing of any nation. To achieve such a work force, it is not enough to prevent occupational hazards or to protect workers against them. It is also necessary to take positive measures to improve current health status and promote a health and safety-oriented culture (22).

In Ethiopia researches done on health care workers exposure to biological hazards in public hospitals are limited. This is practically true because no such assessment is yet done in health care facilities of west Shoa Zone. Therefore this study was designed

to assess the magnitude of exposure to biological hazards and associated factors among health care workers in public hospitals of west Shoa zone.

## **CHAPTER-TWO: LITERATURE REVIEW**

The development and implementation of preventive health and safety programmes in health care institutions are not only critical to protecting health care workers from exposure to workplace hazards, it is also necessary for protecting patients and improving the conditions in which health care workers can provide quality health care. The active participation of HCWs in their own workplace health and safety programmes can contribute to raising awareness amongst HCWs of the importance of exploring the link between their patients' illnesses and their exposure to workplace hazards (23).

The fundamental ethic of health care is that sick persons must receive care. This premise carries an unstated consequence: an occupational risk to HCWs who respond to the needs of contagious patients. So since occupational accidents and work related injuries to the health of HCWs occur at the individual work place, preventive and control measures within the health facilities should be planned and initiated jointly by the employer, managers and workers concerned (24).

### **2.1. Socio-demographic factors**

Globally occupational exposure to body fluids among HCWs consists a major occupational hazard. The cost of disease from occupationally acquired hepatitis B, hepatitis C, and HIV infection is high. World Health Organization estimates that of 35 million HCWs worldwide, approximately 3 million experience percutaneous injuries each year. Of those injured HCWs, 70,000 are likely to be infected with hepatitis B virus as a result of exposure, 15,000 with HCV, and 1,000 with HIV. Although the majority of these occupational infections occur in developing countries where the prevalence rates of blood borne pathogens are high, most documented infections are reported from industrialized countries, where surveillance is most commonly conducted (25).

Occupational Safety and health Administration has determined that certain employees face a significant health risk as a result of occupational exposure to blood and other potentially infectious materials, because they contain blood borne pathogens. It is estimated that approximately 5.6 million workers in health care and other fields

are exposed to blood borne pathogens globally. The proportion of health-care workers in the general population varied substantially by regions (0.2%–2.5%), as did the average number of injuries per health-care worker (0.2–4.7 sharps injuries per year) (26).

A study on occupational risks of HIV infection among 99 Dutch hospitals health care workers working in AIDS endemic areas showed that, 61% reported percutaneous exposures. The mean number of injuries was lower among physicians (2.0 versus 3.9 per year) and higher among nurses (1.9 versus 1.2) than in previous research conducted in 1987-1990 (27).

According to a study in Jordan indicates HCWs whose sex; age; experience years; hospital sector, occupation group; education level; working area were: - female, younger than 30 years old, more than 2 years, public, nurses, a bachelor degree, intensive care unit their injuries were during use of devices/instruments, respectively, exposed more to NSIs and body fluids when compared with the other subgroups (28). A study in United States showed that nurses reported 52% of all incidents of exposure to body fluids that involve contact with non-intact skin or mucous membrane more than workers in any job category (29).

The World Health Organization reported that while 90% of infections among healthcare providers are attributed to occupational exposure in the developing world, 90% of the reporting of occupational exposure to blood and body fluid is from the developed world. Failure to report an exposure increases the likelihood of consequential infection (30).

In Ethiopia, nurses have a 29% and 31% risk of unsafe exposure to bodily fluids and NSIs respectively (31). As study conducted on 254 health care workers of Jimma zone, Ethiopia showed that 174 (69%) health professionals were exposed to the HIV risk conditions. The majority (60.3%) sustained needle pricks or cut by sharps, 44.3% exposed to blood and 39.1% to patients' other body fluid and this indicated that 145(57%) of the respondents were exposed to blood and other body fluids. The proportions of exposure to patients' body fluid among the different professional categories differ significantly ( $P=0.002$ ) (32).



## **2.2. Work Environment (Organizational) Factors**

As study conducted on nurses at Emergency department in Athens, 87.1% of the participants reported exposure to body fluids while 52.8% reported exposure during evening shift, 30.6% during morning shift and 16.7% during night. Seventy seven percent (77.2%) reported through the skin needle stick injury. Besides length of stay and number of activities, characteristics of the work setting were associated with the frequency of different kinds of injuries. Carelessness (e.g. due to fatigue) or being in a hurry (e.g. because of an emergency) were also often the cause of percutaneous injuries, as were the poor quality of the equipment, lack of professional skills, or a combination of these factors (33).

Although exposure prevention remains the best strategy for protecting HCWs from occupationally acquired infection, exposures are nevertheless likely to occur. Employers should have in place a system that includes written protocols for prompt reporting, evaluation, counseling, treatment, and follow- up of occupational exposures that may place a worker at risk of blood-borne pathogen infection (34).

To prevent transmission of blood-borne pathogens, HCWs must adhere to standard precautions and follow fundamental infection control principles. These principles and practices need to be made explicit in institutional policies and reinforced through in-service education for all HCWs, including those in ambulatory care settings (35).

A study in United States, working jobs with overtime schedules was associated with a 61% higher injury hazard rate compared to jobs without overtime. Working at least 12 hours per day was associated with a 37% increased hazard rate and working at least 60 hours per week was associated with a 23% increased hazard rate (36).

The overall picture that emerges from all parts of the developing world is one of increased health and safety risks in all occupations for which data are available (37). A study in rural developing countries shows that health care workers are at greater risk due to sub-optimal infection control practices like lack of equipment, inconsistent use of the equipments and trainings. This study showed that proportion of HCWs exposed to blood and other body fluids during 2011 and 2012 years was 37.1 % and 63.2% respectively (38). Also a study conducted in Nigeria showed that 31.0% of the health

workers have had NSI and only 19.5% of them reported the injury to the health authority (39).

The HIV/AIDS impacts on the health workforce and health systems are an added insult to the already fragile health systems in developing countries which are characterized by poor infrastructure, insufficient numbers of service providers, lack of drugs and commodities and frequently poor management. In addition to a solution to workforce shortages within the health sector, policies are needed to ensure the safety of staff as well as to provide care and treatment for those with HIV/AIDS (40).

According to study in south eastern Nigeria Shortage of Gloves were wide spread. Only the theatres and laboratories had up to 10 paires of new gloves in stock. Most departments used disposable gloves .Aprons were available mainly in the theatres and labour rooms but not in the wards. Rubber boots were in use only in the theatres but protective eye wear was not available at all. It was observed that in some instances were these materials were in correctly used (41).

According to a study in West Africa to document accidental blood exposure risks (ABE), out of 1241 HCWs, 567 (45.7%) had sustained at least one accidental blood exposure and incidence of 1.8 NSIs/HCW/year in surgeons. The accidental blood exposure was a needle stick in 454 (80.1%) of 567 cases, a splash or contact with non-intact skin in 87 cases (15.3%). Due to shortage of human power working overtime is also common (42).

A study among Addis Ababa hospitals showed that IP training decreases by 70% the risk of needle stick injuries (43). In contrast, similar study conducted in Ethiopia at country level showed that taking training on IP not found to be protective from occupational exposure such as needle stick injuries (44).

### **2.3. Behavioral Factors**

Additional factors which further enhance the risk of exposure and transmission are virtual non-existing infection control activities in various institutes mainly due to the lack of training and awareness amongst HCWs as well as administrators. In many health institutions mouth pipeting, sharing of instruments, reuse of syringes and sutures are still in practice. Health care workers engaged in washing of used glass ware and cleaning of equipment is not familiar with personal protective ware and work with

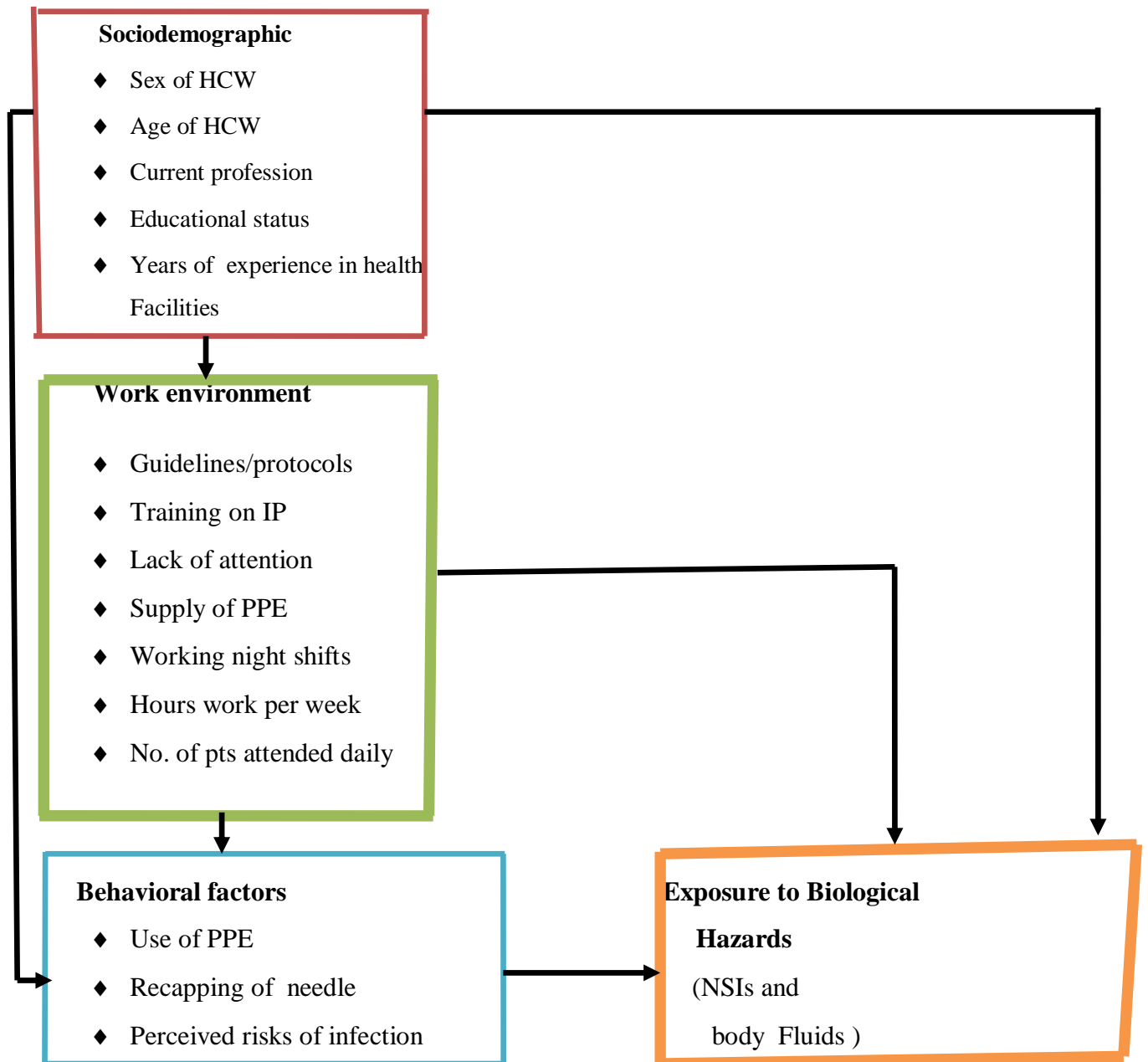
bare hands. Additionally, disposal of clinical waste is not appropriate which further aggravates the frequency of needle stick injuries to staff engaged in final disposal (45).

A study on occupational exposure to body fluids of patients in teaching hospitals in Tehran showed that 53.4% of HCWs exposed to body fluids. Recapping was the most common cause of needle stick injuries (26.5%) (46). A study in five medical disciplines (anesthesia, surgery, dermatology, gynecology, and pediatrics) of the University clinic in Frankfurt also showed that 31.4% of the respondents had experienced at least one NSI in one year (47).

In summary, the review found that occupational exposures to biological hazards are very common among health care workers. This may also depend on their adherence to proper protocols, procedures, availability of PPEs, working shifts, Training on IP and working over loads.

As shown in the following conceptual framework (**Figure 1**), exposures to biological hazards usually occurred as a result of the interplay of many factors, which have different level and degree of influence. Different socio-demographic factors, which are indicated in the upper corner of the framework, are most likely to act through a number of other interrelated factors, including work environment and behavioral factors (indicated in the lower corner of the framework). Variables near the top of the figure influence those below them. Accordingly, socio-demographic factors may affect most other group of factors. These may include work environment factors. These factors, in turn, may affect the individual behavioral factors. Finally, all of the above group of factors may affect the risk of acquiring biological exposures.

## 2.4. Conceptual Frame Work of the Study



**Fig.1.** Conceptual frame work of the assessment of exposure to biological hazards and associated factors among health care workers in public hospitals of west Shoa zone, central Ethiopia, October 2013 (Adapted from Tadesse, 2008).

### **CHAPTER THREE: SIGNIFICANCE OF THE STUDY**

Exposure to biological hazards in developing countries has always been there, it is becoming one of the areas which have to get attention of health care workers, programmers and evaluators. HBV, HCV, HIV and many other infectious organisms have been there for many years and continue to be a common reason for poor and ill health of health care workers.

In Ethiopia also there is no sufficient data that clearly indicate the magnitude of exposure to biological hazards among health workers in health care facilities. Therefore this study will have a significant input in identifying the pattern of exposure to biological hazards in hospitals level in the study area. As a result this study will provide important information for HCWs, program managers, decision and policy makers to design and focus on appropriate interventions that fill the identified gaps and mitigate the problem.

## **CHAPTER-FOUR: OBJECTIVES**

### **4.1 General Objective**

To assess Exposure to Biological hazards and associated factors among health care workers in hospitals of West Shoa Zone, Central Ethiopia.

### **4.2 Specific Objectives**

1. To determine the percentage of health care workers exposed to NSIs.
2. To determine the percentage of HCWs exposed to body fluids.
3. To identify factors associated with exposure to NSIs among health care workers.
4. To identify factors associated with exposure to body fluids among health care workers

## **CHAPTER-FIVE: METHODS AND MATERIALS**

### **5.1. Study Area and period**

West Shoa zone is found in Oromia Regional state, at the central part of the country. It is located 126km far away from Addis Ababa to the western direction. It has eighteen (18) woredas and one town administration. This zone has total area of 14,921.19km<sup>2</sup>. It is bounded by Ahmara regional state in the north, Jimma zone and south west Shoa in the south, Fifiye Zuriya liyu Zone in the east and East Wollega in the west. It has total population of 2,381,077(male=1,189,930 and female =1,191,147). Male to female ratio is about 1:1. Out of these total population 288,477(12%) of them are inhabit in urban areas and 2,092(88%) of them inhabit in rural areas. Concerning public health care infrastructures there are three hospitals with 245 health professionals, 81 health centers and 450 health posts. In addition to this west Shoa has also private health institutions: two specialty dental clinic, 36 medium clinic, 141 lower clinics and 40 drug stores. It has also total of 1875 health professionals of different disciplines including health extension workers (48).

The study was conducted from October 9/10/2013-30/10/2013 G.C.

### **5.2. Study Design**

Cross-sectional study using both quantitative and qualitative methods was conducted.

### **5.3. Source Population**

All health care workers (both technical and non-technical staffs) of Gindeberet, Gedo and Ambo hospitals.

#### **5.3.1. Study population**

All health care workers in Gindeberet, Gedo and Ambo hospitals who have the risk of exposure to biological hazards and were present during the period of data collection.

## **5.4. Eligibility Criteria**

### **5.4.1. Inclusion criteria**

All health care workers in Gedo, Gindeberet and Ambo hospitals at risk of exposure to biological hazards who had at least one year of experience were included since the reference time for the study was 12 months.

## **5.5. Data Collection Process and Instrument**

### **5.5.1 Study Variables**

#### ***5.5.1.1. Dependent/outcome variable***

Exposure to biological hazard

- Needle stick injury (Yes/No)
- Exposure to body fluids(Yes/No)

#### ***5.5.1.2. Independent Variables***

- |  |   |
|--|---|
| ◆ Sex                                      | - Use of PPE                              |
| ◆ Age                                      | -perceived professional risk to infection |
| ◆ Educational status                       | - Recapping of used needles               |
| ◆ Years of experience in health facilities |   |
| ❖ No. of patients attended daily           |   |
| ❖ Working night shifts                     |   |
| ❖ Hours worked per week                    |   |

### **5.5.2. Sample Size and Sampling Technique**

#### ***5.5.2.1 Qualitative Part***

Purposive sampling technique was used to select participants of the in-depth interview. The selection was based on their responsibility in hospitals and years of experience in health facilities. Twelve in depth interviews were conducted for the qualitative study. To get rich information the study included three hospital managers, three clinical directors of the hospitals, three experienced head nurses, and three infection prevention committee coordinators of the three hospitals were participants of the in-depth interview. The interviews were limited to **12** participants because of



saturation/ redundancy of information. In-depth interview participants were not included in quantitative study.

#### **5.5.2.2 .For the Quantitative part**

By using inclusion/exclusion criteria two hundred four (n=204) HCWs at risk of exposure to biological hazards were included in the study.

#### **5.5.3. Data Collection Instruments**

Data was collected using self-administered structured questionnaire and in-depth interview guide adapted from previous tools that were applied in different studies related to exposure to biological hazards (49, 50). Accordingly, redundancy, vagueness, and logical flow of the questions were looked in to. The quantitative questionnaire was grouped into four main sections:

1. Identification of respondents,
2. Background information/socio-demographic characteristics,
3. Working environment (Organizational factors) and
4. Behavioral factors and history of exposure to biological hazards

In-depth interview guide also contain the above four sections.

#### **5.5.4. Data collection process**

Two diploma nurses and one degree holder environmental health professional were recruited for data collection and supervision, respectively, as research assistants. Recruitment was done taking into consideration their past involvement in similar activities. Two days training was given on the aim of the research, content of the questionnaire, and in-depth interview guide. They were trained by principal investigator. For the quantitative study the number of all HCWs in each hospital existing in each department by profession was obtained from the hospitals administrative bodies. The research assistants distributed self-administered structured questionnaires after obtaining HCWs' consent and offered necessary instructions for the respondents to fill it anonymously and correctly. A mutually convenient time was fixed for collection of filled up questionnaire. In-depth interviews were conducted by the principal investigator using in-depth interview guide and tape recorder.

Supplementary notes were also taken. The discussions took from forty minutes to one hour for each participant.

## **5.6. Operational definition**

**Exposure to biological hazards-** exposure of HCWs to potentially infected body fluids like blood, semen, vaginal secretions, cerebro-spinal, pleural, peritoneal, pericardial, human breast milk and amniotic fluids via broken skin(non-intact skin),eyes, mucous membranes, and parenteral in hospitals .It was measured by NSIs and exposure to body fluids.

**Health care Workers-**are all workers in hospitals including both technical and non-technical staffs regardless of their professional category.

**Health care workers at risk of exposure to biological hazards** – Health care workers who came in contact with patients or were potentially exposed to biological hazards from patients while attending to or performing their duties. These HCWs included nurses, lab.technicians, physicians, dentists, health officers, x-ray technicians, ophthalmologists, anesthetics, cleaners and laundry workers working in public hospitals (13).

**Needle stick or prick injury:** the parenteral introduction in to the body of blood or other potentially infectious materials by a hollow-bore needle or sharp instrument, including, but not limited to, needles, lancets, and other sharp materials during the performance of duties in hospitals.

**Personal Protective Equipments:** Are protective equipments that provides physical barrier between micro-organisms and the body of health care workers in hospitals. It includes gloves, goggles, mask, apron, gown, boots/shoe covers and cap/hair cover.

**Consistent use of PPEs:** Using of personal protective equipments correctly at all times where contact with patient’s body fluids may occur in hospitals.

## **5.7. Data Analysis**

Quantitative data was coded and entered using EPIDATA version 3.1 and was exported to SPSS version 16 and analyzed by using descriptive, bivariate and multivariate techniques. Data was described and presented using tables, pie chart and other graphs. The variables found to be significant at  $p < 0.25$  were the candidates for multivariate analysis. Ninety five percent confidence interval (95% CI) was used in identifying important predictor variables of the outcome variable and P-value less than 0.05 was considered statistically significant. Binary logistic regression was used based on the hierarchical relationship of the factors for assessing the relative effects of socio-demographic, work environment and behavioral factors on the outcome variable (occurrence NSIs/Exposure to body fluids). To avoid many variables and unstable estimates in the subsequent models, only those which reached a  $p < 0.25$  starting from the bi-variate analysis were kept in the subsequent steps.

First, based on the results of the bivariate analysis, the effects of selected socio-demographic factors on the magnitude of NSIs/Exposure to body fluids were assessed. In the second step of analysis, work environment/organizational factors were included, and their effect was seen in the presence of socio-demographic factors. Finally, behavioral factors were added to see their effect in the presence of socio-demographic and work environment factors. Variables which reached a p -value of less than 0.05 in the final model were considered as having association with occurrence NSIs/Exposure to body fluids.

The qualitative data that obtained from in-depth interviews were analyzed by using thematic analysis technique. The raw data was in the form of field note and tape recorder documents. The discussions were transcribed into written text for analysis. The translated text document was coded manually to generate issues and ideas expressed, bring into single category/theme. Then the transcribed, translated (into English) and coded data was analyzed as per themes emerged. Finally the descriptive summaries were made based on what participants described and triangulated with quantitative study findings.

### **5.8. Data Quality Control**

The questionnaire was pre- tested at Kidus Lukas hospital by taking 5 percent of the study population on similar setting not included in the study and necessary modification in the questionnaire was made based on the nature of gaps identified in addition to giving training for research assistants. The questionnaire was self administered type, which was first prepared in English then translated to Afan Oromo for data collection. The filled up questionnaire was checked in the participant's presence to check for any inconsistent answers and incomplete questionnaires. When one of these problems observed the questionnaires were referred back to participants to correct the errors on the spot. A day to day on site supervision was carried out during the whole period of data collection by the supervisor and the principal investigator. At the end of each day, the questionnaire was checked for completeness and consistency by the supervisor and investigator and discussions were under taken with the data collectors.

### **5.9. Ethical Considerations**

Prior to data collection appropriate ethical clearance was obtained from the Ethical Review Committee of Jimma University. Official letters of cooperation were written from West Shoa health office for respective hospitals as well as from Jimma university health services management department to administrators of the hospitals and west Shoa zonal health department. Confidentiality was also assured for the information provided since the name of the information provider was not stated on the questionnaire rather coding system was applied. Finally verbal consent was requested from every study participant included in the study during data collection time after explaining the purpose and benefits of the study.

### **5.10. Dissemination Plan**

The findings will be presented to the Jimma University scientific community and submitted to the department of Health services management and college of public health and medical sciences. The findings will also be communicated to local health planners; relevant stake holders at hospital, zonal and regional level in the area to enable them take recommendations in to consideration during their planning process. We will also submit the findings for possible publication on a peer reviewed journal.

## CHAPTER SIX: RESULTS

### 6.1. Socio-demographic and Work Environment Characteristics of the Respondents

A total of 204 HCWs participated in the study. Six questionnaires which were not properly filled were excluded. The final analysis was done for 198 HCWs (response rate=97.1%). Ninety seven (48.9%) respondents were from the **General** hospital (Ambo) and 101(51.1%) respondents were from the two **primary** hospitals (Gindeberet and Gedo).

Among total respondents 115(58.1%) were females. The age of respondents ranged from 20 to 45 years with a mean (SD) age of 30 ( $\pm 5.96$ SD) years. Regarding professional category, 108(54.5%) were nurses and 18 (9.0%) were physicians (specialists or General practitioners). Concerning the respondents' religion 111(56.1%) were Protestants.

One hundred one (51.0%) respondents had less than 4 years of experience. The mean (SD) of years of experience in health facilities was 6( $\pm 4.53$ SD) and the median years of experience was 4 years. The mean (SD) of number of patients attended per day by a health professional was 26( $\pm 11.72$ SD).

**Table 1:** Socio –demographic and work environment characteristics of health care workers in public hospitals, west Shoa zone, October 2013(n=198).

S/N	Characteristics	Frequency	Percent	
1	Sex	Male	83	41.9
		Female	115	58.1
2	Age in Years	<30(below mean)	118	59.6
		≥30(above mean)	80	40.4
3	Current Profession	Physicians	18	9.0
		Nurse	108	55.0
		Lab.	15	7.0
		Cleaners	24	12.0
		Laundry workers	17	9.0
		Others*	16	8.0
4	Religion	Protestant	111	38.4
		Orthodox	76	56.1
		Muslim	11	5.5
5	Marital status	Never married	77	38.9
		Married	114	57.6
		Widowed	5	2.5
		Divorced	2	1.0
6	Years of experience in health facilities(Yrs)	<4 (below median)	101	51.0
		≥4 (above median)	97	49.0
7	No. of patients attended to daily(only for H/P)	<26 (below mean)	79	50.3
		≥26(above mean)	78	49.7
8	Working night shifts	Yes	162	81.8
		No	36	18.2
9	Hours worked per week	<40	22	11.1
		≥40	176	88.9
10	Educational status	Attended up to grade 12	34	17.1
		Completed 10+3/12+2	96	48.4
		Completed 12+3/12+4 and above	68	34.5

\*Others refers to Dentists, X-ray technicians, ophthalmologists, anesthetics

## 6.2. Use of personal protective equipment

Out of the total respondents 121(61.1%) were consistently using PPEs. Inadequacy of such equipment (53.1%) and unavailability of equipments in their hospital (18.2%) were the main reasons for non-adherence to PPEs. Other Reasons mentioned by the respondents were did not want to use equipment (29.3%) and difficulty to work with such equipment (15.4%).

This problem was also supported by findings in the in-depth interviews. Most of the in-depth interview participants from all hospitals agreed on the presence of non-adherence to wearing personal protective equipments. ***One of the hospitals managers stated, "Without wearing adequate protective equipments some of the cleaners and laundry workers carried dirty clothes and medical wastes, which could predispose them for a number of biological hazards."***

The other issue agreed on by the participants was the lack of personal protective equipments related to shortage of budget. This problem has a great impact on regular utilization of personal protective equipments when and where they were necessary for health care workers to protect themselves from different occupational hazards. It was noted that the health care workers at times fail to use even those equipments at their disposal for several reasons. ***A 33 years old male physician commented, "shortage of man power especially during duty hours, when many fighting cases and mothers might visit to get delivery services, at that time health workers get tired by providing essential routine and emergency services, as a result they become busy and couldn't get time to wear personal protective equipment."***

Table 2: Use of personal protective equipments among health care workers in public hospitals of west Shoa zone, October 2013(n=178).

S/N	Characteristics	Job category				Total	
		Health professionals(n=147)		Supportive staffs n=31			
		No.	%	No.	%	No.	%
1	Examination glove	125	85.5	10	31.5	135	75.8
2	Gown	142	97.3	7	21.9	149	83.7
3	Utility glove	23	15.8	29	90.6	52	29.2
4	Boots	27	18.5	12	38.7	39	21.9
5	Apron	41	28.1	29	90.6	70	39.0
6	Head cover	37	25.3	27	84.0	64	35.9
7	Mask	31	21.0	10	31.5	41	23.0
8	Goggles	21	13.7	5	18.8	26	14.6

\* Percents do not add up to 100 due to multiple responses

### 6.3. History of Exposure to body fluids by the types of the fluids

Majority of the health care workers were more frequently exposed to body fluids. Out of the exposed HCWs 110 (55.5%) were exposed to blood at least once during the last one year. The second common fluid to which the workers were exposed was amniotic fluid 49 (42.3%) followed by human breast milk. Results of the in-depth interview also show that majority of health care workers exposed to two major types fluids in their hospitals i.e. blood and amniotic fluids.



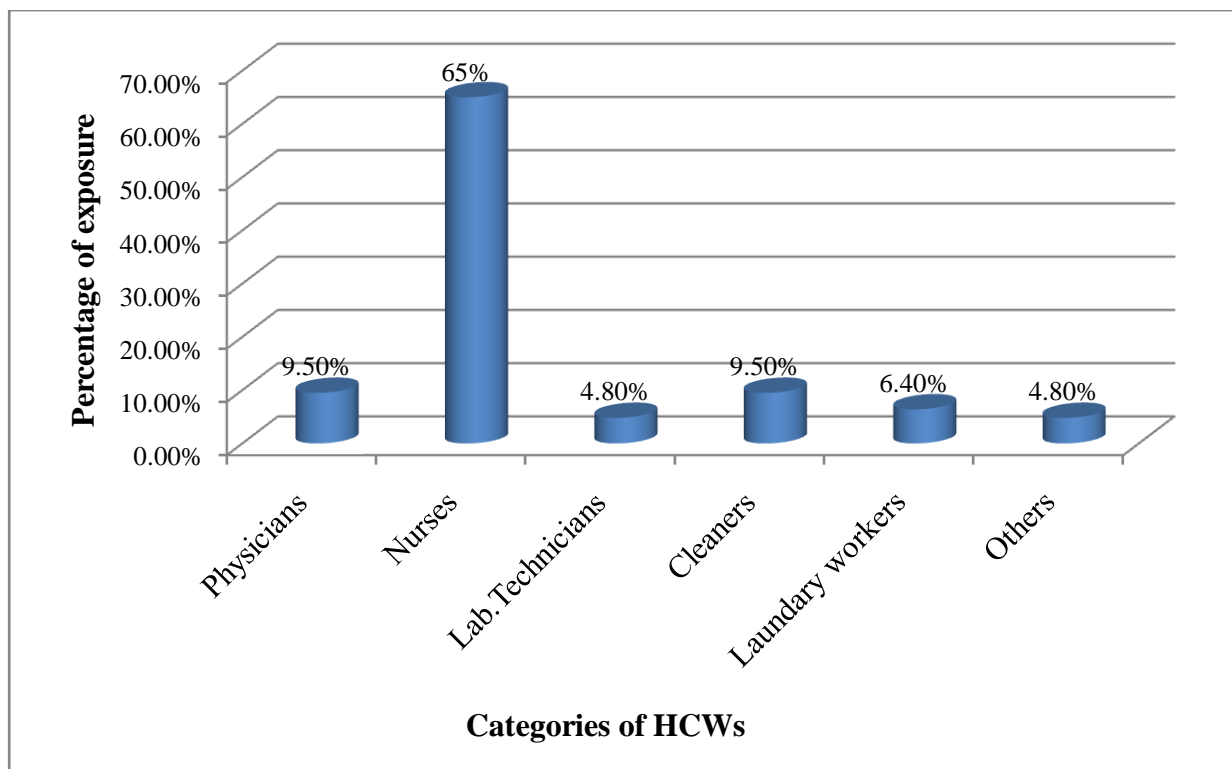
Table 3: History of Exposure to body fluids by type of body fluids which HCWs were exposed, in public hospitals of west Shoa zone, October 2013(n=130).

S/N	Type of fluids	Job category				Total	
		Health professionals(n=111)		Supportive staffs n=19			
		No.	%	No.	%	No.	%
1	Blood	97	61.7	13	68.3	110	55.5
2	CSF	16	14.4	0	0.0	16	12.3
3	Human breast milk	29	26.1	6	31.6	35	26.9
4	Peritoneal fluid	18	16.2	0	0.0	18	13.8
5	Pleural fluid	20	18.0	0	0.0	20	15.4
6	Amniotic fluids	49	44.1	6	31.6	55	42.3
7	Seminal/Vaginal fluids	29	26.1	0	0.0	29	22.3
8	Exudative fluid	21	18.9	3	15.8	24	18.5

\* Percents do not add up to 100 due to multiple responses

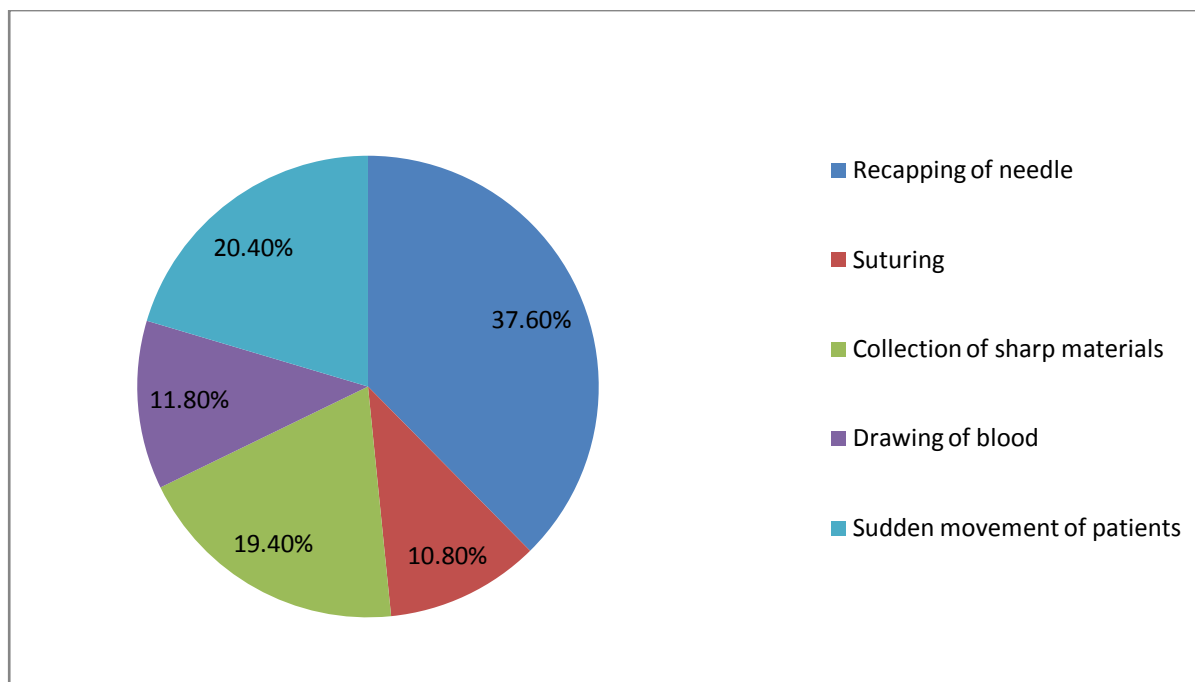
#### 6.4. Needle sticks injury among health care worker

About half (51.0%) of the respondents had sustained at least one NSI/prick injury . Among these 63(62.3%) experienced NSIs in the last 12 months. Out of these (HCWs) injured within the last 12 months 23(36.6%) were sustained once, 22(35.5%) were sustained twice and 18(27.9%) respondents were sustained three times. Depending on these frequencies of last 12 months, the rate of NSIs was among the health care workers were estimated at 1.95 injuries /HCW/year. When we see the HCWs injured by professional category 6(9.5%) physicians and 41(65%) nurses.



**Figure 2:** Pattern of exposure to needle stick injuries among HCWs in public hospitals, west Shoa zone, October 2013.

The leading activity to cause needle stick/prick injury within the last 12 months was recapping of needle. Twenty three (37.6%) of the respondents sustained the injury during recapping of needles.



**Figure 3:** Activities cause needle stick injuries among health care workers in public hospitals, west Shoa zone, October 2013.

The results of qualitative study also show that recapping of used needles was the most important factor for needle stick/prick injuries. *A 35 years old female Nurse explained, “Exposure to needle stick injuries were mainly caused by recapping of used needles in the injection room; another reason is movement of patients. This condition mostly observed among children less than 10 years old.”* One of the basic issues most participants agreed on was that multiple procedures were conducted in too small or single working rooms which could predispose health care workers, clients and the community at a higher risk of needle stick or sharp injury. *A 30 years old head nurse from Ambo hospital said: “A single room was serving for many services like instrument processing, injection, dressing etc., which highly contribute for health care workers’ exposure to needle stick injuries.”*

## **6.5. Exposure to body fluids Either by Contact or splash**

One hundred sixty two (81.8%) HCWs were exposed to Blood and body fluid either by splash to their eyes, nose, and mouth or by contact with non-intact skin. Among these 130 (65.7%) respondents were exposed to body fluids of any type at least once within the last 12 months. Regarding professional categories of the exposed HCWS, 10(7.7%), physicians, 76(58.5%) nurses, 8(6.2%), laboratory technicians, 17(13.1%) cleaners, 12(9.1%) laundry workers and 7(5.4% ) were others categories. This indicated that nurses exposed more than any other category of HCWs in hospitals in the study area. As participants of the in-depth interview agreed commonest reported exposure incidents in their hospital included blood and amniotic fluid splashes. Exposure often happened during cases of emergency when the HCW didn't have enough time to prepare the appropriate protective material.

*“Many health care workers were giving priority to save the life of patients who need emergency care in emergency department without wearing adequate personal protective equipments rather than protecting themselves. Due to this reason they exposed for blood and other body fluids of patients.” A 35 years old male nurse in Gindeberet hospital.*

## **6.6. Existing Practices Related to Occupational Exposure**

Only 99(50.0%) of the respondents were trained on infection prevention/standard precaution in their entire work career. Out of the trained respondents 80(80.8%) were health professionals. Only 103(52%) of the respondents have the information about the presence of guidelines that are used for the welfare of the health care workers in their health institution. Most participants of the in-depth interviews agreed that most of health care workers in the hospitals were not trained on infection prevention. They also agreed on the presence of non-functional infection prevention committee in all hospitals in the study area due to not giving attention for the issue as well as due to lack of frequent and supportive supervision from regional health bureau. This contributed for the increment in number of exposed health care workers for different biological hazards. *A member of infection prevention committee in a hospital reported: “Newly employed health care workers have to get training on infection*

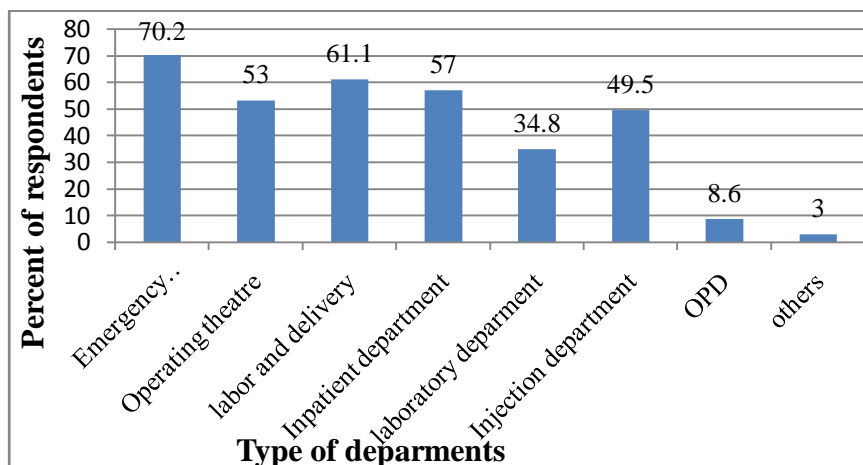
prevention, but this is not being done in our hospital due to shortage of budget. Last year one male midwife nurse was exposed for amniotic fluid splash to his eyes, mouth and nose within three months of his assignment in this hospital.”

Majority of the in-depth interview participants raised that to some health care workers such as cleaners and laundry workers, infection prevention guide line which was prepared in English is difficult to understand its message. This barrier also contributed for the exposure of these workers to biological hazards.

Out of the total respondents 139(70.2%) respondents perceived that emergency room as the most common risky section for exposure, 113(57%) delivery room is the most common risky section and 105(53%) respondents described operation room is the most common risky section according to their hospital. This perception of respondents in this quantitative study was supported by the results of qualitative study.

Almost all participants of in depth interview agreed that from the previous histories of exposures in their hospitals in emergency room, injection room, delivery room and operation room considerable number of health care workers were exposed for different biological hazards than other departments.

*“In hospitals most of health care workers have a potential to be exposed to different biological hazards regardless of their working department but emergency room, laboratory, delivery, ward (inpatient) departments was considered to be the commonest risk of occupational exposure in hospitals.” A 31 years old female physician in Ambo hospital.*



**Figure 4:** Pattern of exposure to biological hazards by department as perceived by health care workers in public hospitals, West Shoa zone, October 2013.

## **6.7. Factors associated with exposure to biological hazards**

### **6.7.1. Factors associated with exposure to needle stick injuries**

The multivariate analysis showed that, HCWs who were less than 30 years old had 2.70 times higher chance to be exposed to needle stick injuries than that of 30 years old and above (AOR=2.70,95%CI=1.03,3.77). From the professional categories, nurses had a higher probability of getting needle stick injuries when compared with others HCWs (AOR=3.03, 95%CI=2.30, 10.4).

Health care workers who were attending at least 26 patients per day had 2times more likely to be exposed to needle stick injuries when compared with those attending less number of patients (AOR=2.07, 95%CI=1.35, 3.34).The chance of getting NSIs among HCWs who were not always using PPEs was about 2.2 times higher compared with that of the users (AOR=2.23, 95%CI=1.25, 5.29). The odds of getting NSIs in HCWs who were not trained on infection prevention is about 1.98times higher compared with trained health care workers (AOR=1.98,95%CI=1.46,4.77).Health care workers who were recapping needle had higher probability of getting NSIs than who were not recapping(AOR=2.34,95%CI= 1.78, 3.94). (Table 4 and 5)

Table 4: Independent predictors of needle stick injuries among HCWs in public hospitals, west Shoa zone, October 2013.

Characteristics		Exposure to NSIs		COR(95% CI)	AOR(95%CI)
Socio-Demographic factors		Yes (%)	No (%)		Final model
Sex	Male	29(34.9%)	54(65.1%)	1.78(1.01, 3.201)*	2.06(0.59,2.87)
	Female†	34(29.5%)	81(70.5%)	1.00	1.00
Age groups in year	<30	42(35.6%)	76(64.4%)	2.70(1.47,4.94)*	2.70(1.03,3.77)*
	≥30†	21(26.3%)	59(73.7%)	1.00	1.00
Current profession	Physician	6(33.3%)	12 (66.7%)	4.55(0.18,17.52)	3.25(0.13,16.21)
	Nurse	41(37.9%)	67(72.1%)	9.86(6.08,21.97)*	3.03(2.30,10.41)*
	Lab.	3(20.0%)	12(80.0%)	3.31(0.34, 15.75)	1.98(0.29,15.95)
	Cleaners	6 (25.0%)	18(75.0%)	2.62(0.36,19.18)	2.01(0.33,18.25)
	Laundry personnel	4(23.5%)	13(76.5%)	3.21(0.86,12.01)	2.26(0.67,11.78)
	Others**	3(18.8%)	13(81.2%)	1.00	1.00
Years of experience	<4	38(37.6%)	63(62.4%)	0.64(0.36,1.12)	0.52(0.26, 1.02)
	≥4†	25 (25.8%)	72(74.2%)	1.00	1.00
<b>Env'tal factors</b>					
No. of patients attended to daily	<26†	28(35.4%)	51(64.6%)	1.00	1.00
	≥26	35(44.3%)	43(55.7%)	1.64(1.34,2.19)*	2.07(1.35,3.34)*
Working night shifts	Yes	49(30.2%)	113(69.8%)	0.44(0.21,0.92)*	1.05(0.66,2.89)
	No†	14(38.9%)	22(61.1%)	1.00	1.00
Hours worked /week	<40†	6 (27.3%)	16(72.7%)	1.00	1.00
	≥40	57 (32.4%)	119(67.6%)	0.73(0.30,1.78)	0.69(0.25,1.93)
Trained on IP/SP	Yes†	28(28.3%)	71(71.7%)	1.00	1.00
	No	35(35.4%)	64(64.6%)	1.75(1.26, 3.09)*	1.98(1.46,4.77)*
<b>Behavioral factors</b>					
Perceived risks of infection	High risk	53(35.0%)	98(65.0%)	2.23(1.73,3.12)*	1.52(0.13, 2.54)
	Low risk†	10(21.3%)	37(78.7%)	1.00	1.00
consistent Use of PPE	Yes†	37(30.6%)	84(69.4%)	1.00	1.00
	No	26(33.8%)	51(66.2%)	2.88(1.21,8.20)*	2.23(1.25,5.29)*
Recapping of needle	Yes	23(33.8%)	45(66.2%)	2.04(1.01,5.23)*	2.34(1.78, 3.94)*
	No†	40(30.8%)	90(69.2%)	1.00	1.00

**KEY** -Variables with P<0.25 entered for both bivariate and multivariate analysis

\* Significant association, p<0.05 at 95% CI

\*\*Others refers to Dentists, X-ray technicians, ophthalmologists, anesthetics

† Reference group

**COR**-Crude Odd Ratio

**AOR**-Adjusted Odd Ratio, **CI**-Confidence Interval

### **6.7.2. Factors associated with exposure to body fluids**

Based on the results of the multivariate analysis, female health care workers had a higher chance to be exposed to body fluids compared with male health care workers (AOR=3.94, 95%CI=2.09, 7.40). This shows that female health care workers had the chance to be exposed to body fluids 4 times higher compared to male health care workers. Health care workers who were less than 30 years old had the chance of exposure to body fluids 1.9 times higher when compared with that of 30 years old and above (AOR=1.87, 95%CI=1.02, 3.92). Type profession also had significant association with exposure to body fluids i.e. nurse (AOR=3.45, 95%CI=1.22, 9.8). Training on infection prevention and always use of PPEs had a significant association with exposure to blood and other body fluids. Health care workers that not trained on infection prevention had the chance to be exposed to body fluids 4.4 times higher when compared with those trained (AOR=4.39, 95%CI=1.98, 9.70) and the odds of exposure to body fluids was higher among HCWs who were using PPEs inconsistently when compared with who consistently used (AOR=2.79, 95%CI=1.35, 13.04).



Table 5: Independent predictors of exposure to body fluids among HCWs in public hospitals, west Shoa zone, October 2013.

Characteristics		Exposure to body fluids		COR(95% CI)	AOR(95% CI)
Socio-Demographic factors		Yes (%)	No (%)		
Sex	Male†	39(46.9%)	44(53.1%)	1.00	1.00
	Female	91(79.1%)	24(20.9%)	4.28(2.29,7.98)*	3.94(2.09,7.40)*
Age groups in year	<30	80(67.8%)	38(32.2%)	2.06(1.10,3.84)*	1.87(1.02,3.92)*
	≥30†	50(62.5%)	30(37.5%)	1.00	1.00
Current profession	Physician	10(55.6%)	8(44.4%)	2.72(1.69,10.63)*	0.44(0.09,2.14)
	Nurse	76(70.6%)	32(29.4%)	5.12(2.34,11.23)*	3.45(1.22,9.8)*
	Lab.	8(50.0%)	8(50.0%)	1.97(1.15,3.36)*	3.43(0.86,13.62)
	Cleaners	17(77.3%)	5(22.7%)	1.68(1.06,7.25)*	2.01(0.62,5.30)
	Laundry personnel	12(70.6%)	5(29.4%)	1.42(0.34,5.99)	3.33(0.88,12.58)
	Others**	7(43.8%)	9(56.2%)	1.00	1.00
Years of experience	<4†	57(56.4%)	44(43.6%)	1.00	1.00
	≥4	73(75.3%)	24(24.7%)	2.35(1.28,4.31)*	1.01(0.43,2.39)
<b>Env'tal factors</b>					
Hours worked per week	<40†	14(63.6%)	8(36.4%)	1.00	1.00
	≥40	116(65.9%)	60(34.1%)	1.10(0.44,2.78)	1.43(0.45,4.52)
Trained on IP/SP	Yes†	56(56.6%)	43(43.4%)	1.00	1.00
	No	74(74.7%)	25(25.3%)	2.27(1.24,4.15)*	4.39(1.98,9.70)*
<b>Behavioral factors</b>					
Perceived risks of infection	High risk	126(65.6%)	66(34.4%)	0.52(0.10,2.63)	0.41(0.21,1.88)
	Low risk†	4(66.6%)	2(33.4%)	1.00	1.00
Consistent use of PPE	Yes†	74(61.2%)	47(38.8%)	1.00	1.00
	No	56(72.7%)	21(27.3%)	3.59(1.01,12.95)*	2.79(1.35,13.04)*

**KEY** Variables with P<0.25 entered for both bivariate and multivariate analysis

\* Significant association, p<0.05 at 95%CI

\*\*Others refers to Dentists, X-ray technicians, ophthalmologists, anesthetics

† Reference group

CI-Confidence Interval

COR-Crude Odd Ratio

AOR-Adjusted Odd Ratio

## CHAPTER SEVEN: DISCUSSION

The study showed that 51.0% of HCWs experienced at least one NSI in their entire career and 31.8% experienced injury within the last one year. Rate of NSI in the last 12 months was estimated at 1.95 injuries / HCW/year. This finding is similar with the studies done previously in Ethiopia and elsewhere in Africa (13, 21, 38). According to WHO studies indicated that health-care workers in Africa suffer two to four needle-stick injuries per year on average, with Nigeria, Tanzania and South Africa reporting 2.10 injuries per HCW on average per year (13). Similar finding was reported from Frankfurt (47).

Recapping of used needles was significantly associated with the occurrence of needle stick injuries. Despite the current national infection prevention guideline recommend not to recap needles, it was still a common practice (51). These points to inadequate training of HCWs, or refusal to follow correct procedures. Another studies also indicated that the practice of recapping of needles was contributed factor for NSIs (46).

Age and professional categories of HCWs were also found to be factors contributed for the chance of sustaining NSIs. Health care workers who were less than 30 years old had a higher chance of experiencing needle stick injuries. This is possibly due to limited professional experience and the fact that young HCWs tend to be enthusiastic and aggressive in their work. Also nurses had a higher chance of experiencing needle stick injuries than others categories. This study is consistent with the study done in Jordan (28).

Inconsistent use of PPEs was found to be associated with chance of sustaining NSIs .Some earlier studies linked consistent use of PPEs with precautions in general. Recapping of needle and inconsistent use of PPEs are factors that could be improved by training. But lack of PPEs is common in developing countries like ours and can partly explain such risk behaviors among HCWs in the study area (40).

About half of the respondents in the study area not participated on training of infection prevention. Therefore, most of them depended on their skills and knowledge they had acquired from school. In line with this finding HCWs who were not trained

on infection prevention highly exposed for needle stick injuries. This study is consistent with a study done in Addis Ababa (43).

This study indicated that about two thirds of participants (65.6%) were exposed to body fluids. This high proportion of exposure to body fluids (65.6%) could be attributed to the fact that being public hospitals, they have high work overload, a factor identified to be associated with occupational exposure to biological hazard in this study. Other possible reason may be due to lack of specific programme measures to address occupational challenges such as inadequate PPEs, lack of information and non-adherence to standard precautions. This finding is higher than the finding of the study conducted in Jimma zone (32). The difference could be due to the fact that the study of the Jimma zone conducted by mixing health care workers from health centers and hospitals, therefore the chance of exposure for HCWs in health centers may be lower than that of the hospitals. Also it may be due to the difference of efforts on infection prevention activities.

Training on infection prevention and inconsistent use of PPEs considered as the predictors of exposure to body fluids. Health care workers who were not trained on infection prevention and inconsistently use PPEs were mostly exposed to body fluids. This is due to the fact that training enhances awareness and improves skills among health care workers. These findings are similar with the study conducted in rural developing countries (37).

But a study conducted in Ethiopia as country level showed that taking training was not found to be protective from occupational exposures (44). The reason of the difference may be the health care workers were not equipped with the knowledge that enable them to protect themselves from the occupational exposures in their working environment by changing the theory of the training to practice. Also due to the fact that there is shortage of logistics such as guidelines/protocols to refer/follow for their safety and lack of necessary equipments at the right time and place in the health facilities.

Being nurse and Sex of the health care workers also had significant association with the exposure to body fluids. Nurses and female health care workers had exposed to

body fluids more than others categories of HCWs and Male health care workers respectively. This may be due to the fact that males are better in safety precautions than females. Similar findings were also reported from other studies (28, 29). A study in United States showed that nurses reported more than half(52%) of all incidents of exposure to body fluids that involve contact with non-intact skin or mucous membrane more than workers in any job category. This reflects that the large number of nurses employed, as well as the frequent patient contact required of nurses.

The main limitations of this study were, as information was self reported, misclassification of HCWs as exposed or not exposed is possible. Information on exposure was asked for the previous 12 months, therefore there is the possibility of recall bias among health care workers. Also due to the study design (cross-sectional), temporal sequence cannot be ascertained.

## **CHAPTER EIGHT: CONCLUSION AND RECOMMENDATION**

### **8.1 Conclusions**

From the findings of the study, the following conclusions were made.

- ❖ Exposures to biological hazards during patient care was common among health care workers in the study area with about one third and two third of the workers encountering NSIs and exposure to body fluids during the last one year. The rate of NSIs was estimated at 1.95 injuries/ HCW/year.
- ❖ Factors associated with occurrence of both NSIs and exposures to body fluids were younger age groups, being nurse, inconsistent use of PPEs and not being trained on infection prevention. In addition to above factors attending many patients per day (work overload) and recapping of used needles also contributed for the occurrence of NSIs as well as being a female were contributed for exposure to body fluids.

## **8.2 Recommendation**

Based on the findings of this study we recommend the following points to reduce the problems for Oromia regional health bureau, hospitals managers, and department heads and infection prevention committees of the hospitals.

### **Oromia Regional Health Bureau**

1. Provide appropriate teaching and learning materials on infection prevention with local language (Afan Oromo) and dissemination of information on risk of health institutions acquired infection to all health care workers is essential.
2. Frequent supportive supervision of hospitals concerning on reducing occupational hazards.

### **Hospital managers (CEOs) and department heads**

3. Hospitals should make avail within their system a standardized written protocol for infection prevention.
4. Initiate and support infection prevention committee.

### **Hospitals Infection prevention Committee**

1. Work with hospital managers to allocate adequate budget for training and purchasing equipments necessary for health care workers.
2. Percolate guidelines/protocols to each department/unit so as to reach each health care worker and utilize it to prevent occupational hazards in their day to day activities.
3. Prepare plan for pre-service and on job training and implement with well experienced and trained health care workers on infection prevention.
4. Regular surveillance of HCWs is needed to monitor the prevalence of occupational hazards for future action.
5. Should give focus on immunization of HCWs against blood borne pathogens.

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## ANNEX: QUESTIONNAIRE

### I. Individual Quantitative Survey Questionnaire English Version

#### Section 1: Identification of Respondents

S/No.	Question	Response	
1	Date of Data Collection		
2	Questionnaire Number		
3	Identification Number of Interviewer		
4	Name of Health Facility		
5	Code of the hospital		
6	Working department/unit		

#### Section 2: Back ground Information

	Question	Response	Code
7	Sex	1.male 2.Female	
8	What was your age at your last birth day?	_____years	
9	What is your main job? Your current technical qualification?	1.Physician 2.Nurse 3.HA/Junior nurse 4.Health officer 5.Midwife 6.Lab technician 7.LaboratoryAssistant 8.X-ray Technician 9.Dentist 10.Cleaners 11.laundry personnel 12.Other(specify)	

10	What is your Educational status?	Illiterate Read and write Grade 1-8 Grade 9-12 10+1,10+2,10+3 12+1,12+2 12+3 , 12+4 12+6 and above	
11	What is your Religion?	1.Orthodox 2.Catholic 3.Protestant 4.Muslim 5.Other (specify)	
12	What is your marital status?	1.Single 2.Currently married 3.Widowed 4.Separated 5.Divorced	
13	How long have you been working in health facilities?	-----years	

**Section- 3: Working Environment (Organizational factors).**

	Questions	Answers	Code
14	At this facility, are written guidelines available to guide the staff and welfare issues?  <b>(circle only one option on each list)</b>	1. Yes 2. No	
14.1	Standard precautions?	1. Yes 2.No 3. Don't know	
14.2	HI V Post-exposure prophylaxis?	1. Yes 2.No 3. Don't know	
15	Have you ever participated in any training programme about infection prevention or standard precaution?	1. Yes 2.No	
16	Have you participated in any training programme about infection prevention or standard precaution in the last one year?	1. Yes 2.No	
17	Is there shortage of PPE in this health facility?	1.yes 2.No	
18	On average, how many patients/clients do you attend daily?	_____Patient	
19	Have you been assigned to work in night shifts?	1. Yes 2.No	
20	On average, how many hours do you work per week in this facility (including duty, holidays and weekends.)	_____hours	

#### Section -4 :Behavioral factors and history of exposure

21	Do you think that you are at risk of blood borne infection?	1. Yes. 2.No	
22	Where you say that you are most likely to get infection? ( <b>only one response</b> )	1.Outside work 2.At work place 3.Same Risk in both places 4.Don't Know	
23	How do you level your risk of infection? ( <b>only one response</b> )	1. High risk. 2.Low risk	
24	Do you wear personal protective equipments?	1. Yes, always 2. Yes, sometimes 3.No	
25	If you wear protective equipments, which one? ( <b>do not read list, circle all mentioned</b> )	1. Apron 2.Utility glove 3.Examination glove 4.Head cover 4.Boots/shoe 5.Eye protection/goggle 6.Gown 7.Other(specify	
26	If your answer for <b>Q.25</b> is 2 or 3, what are the reasons? ( <b>do not read list, circle all mentioned</b> )	1.It is difficult to work with such equipment 2.Not always necessary an availability of equipment 3. Inadequacy of equipment.	



		4.other(specify)	
27	When did you use glove? ( do not read list, circle all mentioned	1.For all people when needed 2.For only HIV suspected cases 3.For only HIV positive cases 4.Other( specify)	
28	How do you wash soiled linen in your health facility( <b>for only technical staff</b> )	1.Using laundry machine 2.Hand washing 3.Both ways 4.Other(specify)	
29	<b>Have you been exposed to the following body fluids in your working environment?</b>		
29.1	Blood	1. Yes 2.No	
29.2	Amniotic fluid	1. Yes 2.No	
29.3	CSF	1. Yes 2.No	
29.4	Human Breast Milk	1. Yes 2.No	
29.5	Pericardial fluid	1. Yes 2.No	
29.6	Peritoneal fluid	1. Yes 2.No	
29.7	Pleural fluid	1. Yes 2.No	
29.8	Synovial Fluid	1. Yes 2.No	
29.9	Exudative fluids from burns or skin Lesions	1. Yes 2.No	
29.10	Seminal/vaginal fluid	1. Yes 2.No	
30	Have you ever had any needle stick or other sharp injuries?	1. Yes 2.No	
31	Have you ever had any needle stick or other sharp injuries in the last One year?	1. Yes 2.No	

32	If yes, how many times have you had these injuries?	1.Once 2.Twice 3.Three times 4.more than three	
33	Do you recap used needles?	1.Yes 2.No	
34	How do you sustain the Recent injury? ( <b>select one only</b> )	1.During recapping 2.By sudden movement of the patient 3.During sharp collection 4.Blood withdrawing 5.Suturing 6.Other(specify)	
35	Have you ever had body fluid splash to your eye, mouth nose or contact with non-intact skin?	1.Yes 2.No	
36	Have you ever had body fluid splash to your eye, mouth nose or contact with non-intact skin just within 12 months?	1.Yes 2.No	
37	As you think what are the most common reasons contributing to needle stick and other sharp injuries among health care workers in this facility? <b>(Do not read list, circle all mentioned)</b>	1.Multiple procedures at the same time 2.exposure due to rushing of time 3.As a result of recapping of needle 4.carelessness of health care workers 5. Lack of knowledge on the Risk. 6.needle or device faulty/defective	

		/ unfamiliar procedures 7. not enough training on the issue 8. not following correct protocol 9. Other specify	
38	What are the most common exposure histories in this health facility? <b>(Do not read list, circle all mentioned)</b>	1. Contact with Blood 2. Needle stick injuries 3. Cuts from sharp instruments 4. Contact of eye and other mucosa with other body fluids 5. Others (specify)	
39	What are the most common units/ departments for occupational exposure? <b>( do not read list, circle all mentioned)</b>	1. Emergency dept 2. Operating theatre 3. Labor and delivery 4. In- patient 5. Laboratory dept 6. Injection room 7. Others (specify)	

II-Questionnaire for Assessment of Exposure to Biological Hazards among Health Care Workers in Public Hospitals of West Shoa Zone (AFAN OROMO VERSION), October 2014.

1. Guyyaa daataan itti funaaname\_\_\_\_\_
2. Lakkoofsa waraqaa gaaffii\_\_\_\_\_
3. Koodii hojjetichaa (ogeessaaf) kenname\_\_\_\_\_
4. Koodii hospitaalichaa\_\_\_\_\_
5. Maqaa kutaa ogeessichi keessa hojjetu\_\_\_\_\_
6. Saala\_\_\_\_\_

7. Umurii \_\_\_\_\_

8. Ogummaan kee maali? **1.** Dooktera (GP or specialist) **2.**Narsii **3.**Gargaaraa fayyaa/juner narsii **4.** Qondaala Fayyaa **5.**Narsii Deessiftuu **6.**Teeknishaana Laabiraatoorii **7.**X-Ray Teeknishaanii **8.**Dentistii **9.**Qulqulleessituu **10.**Hojjetaa laawundarii **11.**Anasthetics

9. Sadarkaa barumsaa kee? \_\_\_\_\_

10. Amantaan kee maali? **1.** Ortodoksii **2.**Kaatoolikii **3.**Prootestaantii **4.** Musliiima **5.**Kan biraa (ibsi)

11. Sadarkaan gaa'elaa amma irra jirtuu maali? **1.** Kan hinfuunne/heerumne **2.** Kan fuudhee/heerumtee jiru/tu **3.**Kan haatimanaa/A/Manaa irraa du'e/te **4.**addaan ba'anii Kan jiraatan **5.**kan wal hiikan

**12.** Dhaabbata fayyaa irra waggaa meeqa hojjetee?

Waggaa \_\_\_\_\_

13. Hospitaala kana keessa qajeelfamni (guideline/protocol) hojjetoota qajelchuu fi bakka hojii isaaniitti balaa adda addaaf akka hinsaaxilamne kan isaan hordofan ni jiraa? **1.** Eeyyee **2.**Lakki

13.1. Qajeelfama akka hojjetootni dhukuboota dhangala'aa qaama keessaa bahuu fi dhiigaan daddarbaniif akka hin saaxilamne gargaaru (Standard precautions)? **1.** Eeyyee **2.** Lakki **3.**Hin beeku

13.2. Qajeelfama hojjetaan dhiigaa fi dhangala'aa qaama namaa keessaa bahanii erga saxila booda eeggannoo inni godhu ibsu (HIV Post-exposure prophylaxis)?

**1.** Eeyyee **2.** Lakki **3.**Hin beeku

14. Leenjii akkaataa “infection” adda addaa ittiin of irraa ittisa irratti fudhattee beektaa? **1.** Eeyyee **2.** Lakki

15. Waggaa darbe kana leenjii akkaataa ittii “infection” adda addaa ittiin ofirraa ittisa (infection prevention) irratti leenjii fudhatteetaa? **1.** Eeyyee **2.** Lakki

16. Hir'inni meeshaalee kanneen akka gilaavii, maaskii, fi kkf (personal protective equipment) akka hospitaala kanaatti ni jiraa? **1.** Eeyyee **2.**Lakki

19. Giddu galeessaan guyyaatti namoota meeqaaf deeggarsa kennita?

Dhukkubsattoota/maamila \_\_\_\_\_ (00 guuti yoo Kan deeggarsa hin kennine ta'e)

20. Dabaree hojii galgalaaf ramadamtee beektaa? **1. Eeyyee 2.Lakki**
21. Giddu galeessaan torbanitti hospitaala kana keessa sa'aatii meeqa hojjettaa? (Guyyaa ayyaanaa, sanbataa fi di'uuttii dabalatee). **Sa'aa\_\_\_\_\_**
22. Carraa 'infection" dhaaf saaxilamuu akkamiin tilmaamtaa? (Deebii tokko qofa)  
**1. Ol'aanaa 2.Gad-aanaa 3.Carraa saaxilamuu hin qabu**
23. Yeroo hojii meeshaalee qaama golgan (personal protective equipment) ni fayyadamtaa (ni uffattaa)? **1. Eeyyee, yeroo hundaa 2.Eeyyee, darbee darbee 3.Lakki**
24. Yoo ni uffata ta'e isa kam? (Deebii tokkoo ol qabaachuu danda'a)  
**1. Apiroonii 2.Gilaavii 3.Kan mataa golgu (head cover) 4.Boottii 5.Kan ijaa (goggles) 6.Gaawonii 7.Kan biroo (ibsi).**
25. Yoo deebiin kee **Lakk.24** 2 ykn3, qofaa ta'e sababni isaa maaliifi? (Deebii tokkoo ol qabaachuu danda'a) **1. Meeshaalee kana uffachuun hojiin waan namatti ulfaatuuf 2. Jiraachuun meeshaalee kanaa yeroo hundaa barbaachisaa waan hin taaneef. 3. Hir'ina meeshaalee waan jiruuf 4. Kan biroo (ibsi)**
26. Gilaavii yeroo kam fayyadamtaa? (Deebii tokkoo ol qabaachuu danda'a)  
**1. Namoota hundaaf yeroo barbaachisaa ta'etti 2.Namoota HIV dhaaf shakkaman qofaaf 3.Namoota HIV pozatiivii ta'an qofaaf 4.Kan biroo (ibsi).**
27. Uffata dhukkubsataanis ta'e ogeessotni fayyaa uffachuun xuraa'e akkamiin miiccitu (**Hojjettota deeggarsaa qofaaf**)  
**1. Maashinii laawunderii fayyadamuun 2.Harkaan 3.Mashinii fi harkaan 4.Kan biroo (ibsi)**
28. Bakka hojii keetti dhangala'oowwan armaan gadiif saaxila baatee beektaa?
- 28.1. Dhiiga? **1. Eeyyee 2.Lakki**
- 28.2. Bishaan buubbee? **1. Eeyyee 2.Lakki**
- 28.3. Dhangala'aa spaayinaal koordii (Cerebrospinal fluid)?  
**1. Eeyyee 2.Lakki**
- 28.4. Aannan harmaa kan namaa? **1. Eeyyee 2.Lakki**
- 28.5. Dhangala'aa onnee marsee argamu (Pericardial fluid) **1. Eeyyee 2.Lakki**

- 28.6. Dhangala'oo garaa namaa keessatti argaman (Peritoneal fluid) **1. Eeyyee**  
**2.Lakki**
- 28.7. Dhangala'aa somba namaa marsee argamu (Pleural fluid) **1.Eeyyee 2.Lakki**
- 28.8. Dhangala'oo buusaa gidduutti argaman (Synovial Fluid) **1.Eeyyee 2.Lakki**
- 28.9. Dhangala'aa qaamaa kan bakka ibiddi gubetti kuufatu (Exudative fluids from burns or skin Lesions) **1.Eeyyee 2.Lakki**
- 28.10. Speermii/dhangala'aa qaama dhalaa keessaa ba'u (Seminal/vaginal fluid)  
**1. Eeyyee 2.Lakki**
29. Waggaa darbe keessa lilmeen ykn waan qara qabu si waraanee beekaa? **1. Eeyyee**  
**2.Lakki**
30. Gaaffii **34** "Eeyyee", yoo jette, si'a meeqa? **1. Al-tokko 2.Al-lama 3.sadii 4.sadii ol**
31. Lilmee hojii irra oole deebistee ni qadaaddaa? **1. Eeyyee 2.Lakki**
32. Yeroo darbe osoo maal hojjechaa jirtuu ti waanti qara qabu kan si waraane?  
(Deebii tokko qofa filatta)  
**1. Osoo lilmee hojii irra oole qadaadaa jiruu (Recapping of needle)**  
**2. Osoon dhukkubsataaf lilmee kennaa jiruu**  
**3. Osoo waantota qara qaban funaanaa jiruu 4. Kan biroo (ibsi).**
33. Dhiigni ykn dhangala'oon qaamaa adda addaa gogaa kee bakka madaa qabutti, ija ketti, afaan keetti ykn funyaan keetti faca'ee beekaa? **1. Eeyyee**  
**2.Lakki**
34. Waggaa darbe kana dhiigni ykn dhangala'oon qaamaa adda addaa gogaakee bakka madaa qabutti, ijaketti, afaan keetti ykn funyaan keetti faca'ee beekaa?  
**1. Eeyyee 2.Lakki**
35. Deebiin gaaffii **33ffaa**" eeyyee" yoo ta'e, Si'a meeqaaf?  
**1. Al-tokko 2.Al-lama 3.Al-lamaa ol**
36. Akka hospitaala kanaatti sababni guddaan hojjettotni balaa tasaaf akka saaxilaman taasisu maali? (Deebii tokkoo ol qabaachuu danda'a)  
**1. Dhiiga nama biiroof saaxilamuu 2.Lilmeen waraanamuu**  
**3. Waantota qara qabaniin muramuu 4.Dhangala'oon qaamaa adda addaa ija, afaanii fi funyaanitti faca'uu**  
**5.Kan biroo (ibsi)**

37. Akka hospitaala kanaatti irra caalaatti ogeessotni balaa tasaa adda addaatiif saaxila bahan kan kutaa kam keessa hojjetani dhaa? (Deebii tokkoo ol qabaachuu danda'a)

- |                         |                          |
|-------------------------|--------------------------|
| 1. Kutaa imerjensii     | 2.kutaa oppireeshinii    |
| 3. Kutaa da'umsaa       | 4.kutaa Ciibsanii yaaluu |
| 5. Kutaa laaboraatoorii | 6.Kutaa lilmee           |
| 7. Kan biroo (ibsi)     |                          |

### III. Participation in In-depth Interview information sheet and Consent Form

#### Information Sheet

Hello, how are you? My name is \_\_\_\_\_. My colleague besides me is \_\_\_\_\_. This is an interview to be done with you for a study that is being Conducted at Jimma University, School of Public Health. The title of the study is Assessment of exposure to biological hazards and associated factors among health care workers in public hospitals of west Shoa zone. The purpose of the study is to assess the extent of exposures to biological hazards among health care workers.

If you agree to participate in this study, you will participate in this interview in a private place. The interview will last for about one hour and will be facilitated by me and my colleague.

During the interview, my colleague will write down what you say. We will also tape record our session. The notes and tapes will not contain your names or other identifying information. They will just be labeled with a study number. Only members of the study team will listen to the tape. The results will assist policy makers, planners and health service providers for making considerations regarding exposure to biological hazards.

There is no possible risk associated with participating in this study. During the interview, we will ask you about any experiences you have had which may cause you to feel embarrassed. You are free to decline answering any question that you do not wish to answer and you may leave our interview at any time you want t

All information obtained will be held securely and stored on paper, tapes and computer files. No one except the interviewers will know that you took part in the study the answers that you give will be marked with a special study number only, and not your name. We will protect information about you in this research to be the best of our ability.

Your participation is voluntary. You may withdraw from the interview at any time without giving a reason and without any penalty.

If you have questions regarding this study or would like to be informed of the results after its completion, please do not hesitate to contact **Dr.Mirkuze Woldie** (0917804051) and/or **Mr.Negalign Birhanu** (0911824873) at School of Public Health, Jimma University.

**Consent Form**: -I have understood the verbal explanation concerning this study and I understand what will be required of me and what will happen to me if I take part in it. I also understand that any time I may withdraw from this study without giving a reason and without me or my families' routine service utilization being affected for my refusal.

*May I continue the interview?*

1. Yes \_\_\_\_\_ Continue the interview
2. No \_\_\_\_\_ Stop the interview and thank the respondent

Witness's signature certifying that the informed consent has been given. Witness's signature \_\_\_\_\_

Date \_\_\_\_\_



#### **IV. In-depth interview Guide**

Hospital Name \_\_\_\_\_

1. Describe your age, sex, work experience and responsibility in this hospital?
2. What is your profession (qualification)? What do you really do in the hospital?
3. Does your hospital have a document (e.g., a mission or corporate values statement) that refers to improving employee health?
4. Do you think biological hazards are common risk in the health workers' environment? Why?
5. Is there Infection prevention guide line in this hospital?

Probe; Are the Health care workers have information on the guide line?

Are health care workers trained on infection prevention?

6. Is there adequate personal protective equipments in all departments?  
How do you see the health care workers habit concerning using of PPE?
7. Which department (unit) mostly affected by the exposure of biological hazards? Why? explain in detail?
8. Which category of professionals mostly exposed (affected) in this hospital in last 12 months? Why?
9. Do you know someone exposed to biological hazards with needle stick injury accident or through in non-intact skin or blood/other body fluid splashed to eyes,mouth,etc in your workplace? Explain in detail.
10. What department do you think would be responsible for coordinating/running the health workers health and safety?

*Probes:*

- a) How would such a program be administered and managed? (E.g. in terms of staffing, coordinating and implementing programs, communications, budget and fiscal management)
- a) What is your hospital's current situation with regard to infection prevention committee? Explain in detail











