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**PRACTICES OF HOSPITAL WASTE MANAGEMENT AND ASSOCIATED  
FACTORS AMONG HEALTH CARE WORKERS OF PUBLIC HOSPITALS  
IN SOUTHWESTSHOA ZONE, ETHIOPIA, 2019**

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**ASSESSMENT OF PRACTICES OF HEALTH CARE EMPLOYEES TOWARDS  
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PUBLIC HOSPITALS IN SOUTHWEST SHOA ZONE, ETHIOPIA**

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## **Acronyms and Aberrations**

AIDS	Acquired immunodeficiency syndrome
AOR	Adjusted Odds Ratio
BBF	Blood and Body Fluid
FMOH	Federal Ministry of Health
HBV	Hepatitis B Virus
HCF	Healthcare Facility
HCV	Hepatitis C virus
HBV	Hepatitis B virus
HCF	Health care facility
HWM	Hospital waste management
HCWs	Healthcare Workers
HIV	Human Immunodeficiency Virus
HF	Health facility
HW	Hospital waste
IRB	Institutional Review Board
IV	Intravenous
MWC	Medical Waste Collector
NGO	Non-Governmental Organization
NSI	Needle sticks Injury
NSSI	Needle Strain Sharps Instrument
OR	Odds Ratio
PPE	Personal Protective Equipment
SD	Standard Deviation
SPSS	Statistical package of social science
SWSZ	South West Shoa Zone
WHO	World Health Organization

## **ABSTRACT**

**Background:** Waste generated in hospital is often synonymously used as health-care waste, hospital waste, medical waste, and infectious waste due to the fact that waste is being generated from medical care provision services to the patients. It is a global hazard to health care workers, patients and environment. Thus, it is imperative to know the level of hospital waste management practice and associated factors among health care workers of public hospital in south west shoa zone for better intervention.

**Objective:** To assess hospital waste management practice and its associated factors among healthcare workers in South West Shoa Zone hospitals, Ethiopia, 2019.

**Methods:** - Facility based cross sectional study design was conducted in 4 (four) public hospitals under the study area. A total of 336 health care workers were included in the study from March 5-30/2019. Data were collected with self-administered questionnaire and observational checklist. The coded data were entered on to computer using Epi data version 3.1 software and exported to SPSS version 25. The data were analyzed descriptively for socio demographic and other study variables. Descriptive statistics such as frequency and percentage was used in the form of text and table. Binary logistic regression was used to check the association between variables. 95% Confidence interval was used to determine the strength of association between variables.

**Result:** Of the total 168 (47.6%) respondents were implementing a proper practice for hospital waste management. Low knowledge and lack of training of healthcare workers were significantly associated with the practice of hospital waste management. HCW who were categorized as knowledgeable were 2 times more likely to practice proper health care waste management than health care workers categorized as poor knowledge {(AOR: 2.315, 95% CI. (1.133, 4.732)}. Health care workers who took training {(AOR: 3.958, 95% CI. (2.390 – 6.540)} were 4 times more likely practiced hospital waste management than health care workers did not take training on HCWM.

**Conclusion:** The current study revealed that there is improper practice of healthcare workers towards hospital waste management and hospitals have to work on awareness creation program for their HCWs on proper practice of HWM.

**Key words:** *Hospital waste management, Practice, Hospital, Health care workers*



## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background**

The World Health Organization (WHO) defines healthcare waste as wastes including all the wastes generated by health-care institution establishments, health-care research facilities and laboratories, including health care wastes produced at home [1].

Hospital wastes are classified in to hazardous waste (HW) materials, including materials, from used needles and syringes to soiled dressing, body parts, diagnostic samples, blood or body fluid, contaminated surgical instruments, delivery bowls, gauzes and gloves, chemicals, pharmaceuticals etc. They represent 10%-25% of the total waste generated in health care facilities. The second classification of HCWs are Non-infectious wastes are those that are not contaminated with blood, body fluids or other infectious agents or materials, such as latex gloves, papers, fabrics, glass, food residues, and containers. They represent between 75%-90% of the total amount of HCWs generated by medical institutions [3].

HW has also consists of different sub categories like Infectious waste which contains pathogens. This category includes cultures and stock of infectious agents from laboratory work, waste from surgery and autopsies on patients with infectious diseases waste from infected patients in isolation wards. Pathological wastes consist of tissues, organs, body parts, human fetuses and animal carcasses, most blood and body fluids. Sharps are items that could cause cuts or puncture wounds, including needles, syringes, scalpels, saws, blades, broken glass and nails. Whether or not they are infected, such items are usually considered as highly hazardous healthcare waste. Pharmaceutical, Chemical, Genotoxic wastes with high heavy-metals and radioactive wastes are the main subcategories of health care wastes mainly in hospital [3, 4].

Health care waste management is a management that undergoes proper health care waste management through several steps that include: generation, segregation, collection, on-site transportation, on-site storage, offsite transportation, treatment and disposal of the HCW.

Waste generated in hospital is often synonymously used as health-care waste, hospital waste, medical waste, and infectious waste due to the fact that waste is being generated from medical care provision services to the patients [5].

Proper handling of health care wastes, which involves appropriate identification, separation, storage and proper disposal of wastes, is a key to minimize health hazards due to wastes. Non-

hazardous wastes from hospital do not pose risk of injury or infections, whereas hazardous wastes can have biological, mechanical and chemical hazards to health workers, patients and local communities. Improper handling of waste not only poses significant risk of infection due to pathogens like HIV, Hepatitis B & C virus but also carries the risk of water, air & soil pollution thereby adversely affecting the environment and community at large [5].

Hospital waste is currently a burning issue more with the increasing health care facilities and increasing waste generation. Therefore the Practice of health care waste of management is essential for the health care workers. The purpose of HCW management is mainly to reduce waste generation, to ensure its efficient collection, handling, as well as safe disposal. Lack of awareness and inadequate knowledge has led to the hospitals becoming the center for spreading pathogens like HIV, Hepatitis B and C virus and carcinogenic effects from other sub categories of medical wastes [6].

## **1.2 Statement of the Problem**

Globally, more than 35 million healthcare workers (HCWs) are suffering from occupational needle stick and sharp injury (NSSI) every year. While as many as twenty blood borne pathogens (BBPs) can be transmitted by accidental injury, the potential life threatening are Human Immunodeficiency Virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV). Moreover, Physical injuries causes health care workers costs of post exposure medical treatment, disability and absenteeism, loss quality of life these problems are occurred form law awareness, attitudes and mal-practice of health care employees in surveyed health care facilities [1,2,3].

Of the total amount of waste generated by health care activities, about 85% is general and the remaining 15% due to poor waste handling and management in general estimates that each year there are about 8 to 16 million new cases of Hepatitis B virus (HBV), 2.3–4.7 million cases of Hepatitis C virus (HCV) and 80,000–160,000 cases of Human Immunodeficiency Virus [6].

Improperly managed hospital wastes causes health risk to medical waste handlers from pathogens that may be aerosolized during the compacting, grinding or shredding process during waste treatment and Physical (injury), health hazards occurred during high operating temperatures of incinerators and steam sterilizers and with toxic gases vented [7].

Studies show that spread of infectious disease like Hepatitis B, Hepatitis C among the waste handlers in Gondar town health care. During works, the waste handlers are faced the needle stick

injuries due to improperly handling of the wastes in the hospital. Waste handlers have lack of preventive measures about handling of wastes [11]

Worldwide the improper management of healthcare waste from its generation, to collection and to its disposal is a serious public health concern because of its negative impacts on health workers, waste collectors, the public and the environment at large. Healthcare workers (HCWs) who are involved in care of patients and working in managing healthcare wastes are facing special occupational hazard because of exposure to sharp injuries and human blood and body fluids. Poor awareness, lack of protective devices, lack of basic training and low attention given by the authorities aggravate the seriousness of the problem [12].

Many findings in developing countries on healthcare wastes management revealed that segregation, collection of waste using recommended color coding container and storage of waste in isolated area were not satisfactory. Personal protective equipment and accessories were not provided and not used by HCWs [13].

It is also true in Ethiopia as few studies done on healthcare waste management indicated that there was no waste segregation in most studied HCFs. Healthcare wastes were stored, transported, treated and disposed inappropriately at all surveyed HCFs [14].

In Ethiopia, now a day, HCFs are becoming greater than ever to address the basic health needs of the society and to achieve the Sustainable Development Goal (SDG). Previous studies focused on healthcare waste management at facility level without identifying the role of each actor on healthcare waste management practices such as HCWs, waste handlers and health managers. Credible evidence show that Healthcare waste management practices of HCEs across Ethiopian health institutions is inadequate. This research study will revealed the gap of healthcare waste management practices of HCEs at healthcare facilities that will be used as baseline information to draw appropriate strategy. The overall medical waste management in health institutions in Ethiopia is poor as wastes are often stored improperly. Bulk clinical waste carts are left in corridors and walkways. [14].

In order to make hospital waste management successful, it is vital that the various HCW working in hospitals have to have correct management regarding hospital waste management. As the above evidence from various parts of the world indicate that, gaps exist in the hospital waste management. Gaps from previous study was focusing on different health care facilities like

Clinics, health centers, and hospitals in private and public, but did not specify on facilities. Now days hospitals in the country including the study area are becoming larger in number than pervious and thus required specific study. However there is no data and no similar study was done in this study area as well as Oromia regional state as researcher come across. This study will be investigating the practice of Health care waste management and associated factors of public hospitals in south west shoa zone. This study will help the authorities to develop strategy for improving the situation through obtaining current status HCW practice amongst health care workers regarding health care wastes in the study area.

### **1.3 Significance of the Study**

The finding of this study will provide useful information about practice of health care waste management of healthcare workers towards hospital waste management and its associated factors in public hospitals of South West Shoa Zone. It also helps to create awareness about waste management in Hospitals which affects hospital community and its environment. Moreover, hopefully this research will also provide information for different stakeholder such as hospital managements, regional health bureau, and health care workers, nurse, laboratory technicians and different organizational affairs on Hospital waste management. It will be also provide the opportunity for the health workers to involve in hospital waste management. Finally, the study will be also used as a base for those who want to conduct further investigation regarding the issue of healthcare workers towards hospital waste management and its associated factors in South West Shoa zone hospitals.

## **CHAPTER TWO: LITERATURE REVIEW**

### **1.1. Definition of Health Care Waste Management**

WHO/UNICEF assessment found more than half (58%) of sampled facilities from 24 countries had adequate systems in place for the safe disposal of hospital Sharps and, more specifically, needles and sharps were considered the most hazardous category of health-care waste for health-care workers and the community at large, because of the risk of sharps and needle-stick injuries which carry potential infection [7].

According to WHO, the correct segregation of health-care waste is the responsibility of the service provider and/or receiver who generate any types of waste item. Hospital managers are responsible for making sure that there is a suitable segregation, transport and storage system in place and that all staff adheres to the correct procedures. Education and training must be provided to all staff that is responsible for both segregation and collection of waste. The appropriate waste receptacle (bags, bins, sharps boxes) should be available in each medical and other waste-producing area in a health-care facility [15].

In order to avoid accumulation of the waste, it must be collected on a regular basis and transported to a central storage area within the HCF before being treated or removed. The collection must follow specific routes through the HCF to reduce the passage of loaded carts through wards and other clean areas. The carts should be 1) easy to load and unload, 2) have no sharp edges that could damage waste bags or containers and 3) easy to clean [16].

According to WHO, Storage sites for hospital wastes should be located away from service units or any public access areas. The waste in bags or containers should be stored in a separate area, room or building of a size appropriate to the quantities of waste produced and the frequency of collection. In cases where the health care facility lacks the space, daily collection and disposal should be enforced. Proper waste transportation of waste within the health facilities could utilize wheeled trolleys, containers, or carts that are dedicated solely for the purpose [16].

Some of the more common treatment and disposal methods utilized in the management of infectious healthcare wastes in developing countries are: autoclaves and retorts; microwave disinfection systems; chemical disinfections; combustion and disposal on land [17].

## **1.2. Knowledge of health care worker about hospital waste management**

Knowledge of health care workers on hospital waste management was inadequate and they were unaware of waste management rules and regulations [8]. Low knowledge in practice of hospital waste management kindly in the identification of waste generation were one of the factors for problems. Of large hospitals indicates that 41% of the waste type is hazardous, 33% are non-hazardous and 26% are combined waste type and the medium hospitals had 35% of waste generated as hazardous and nonhazardous 35% while 30% is of combined type; while in the small scale hospitals the combined waste type constituted the dominant waste types with 51% followed by non-hazardous 31% and hazardous waste type having the least with 18% in Nigeria [9].

Improper handling of hospital waste in Sidama Zone (Ethiopia) showed that 42.5% of health institutes used incinerators to handle syringes, needles and other sharp objects; 35% of these institutes collected and disposed syringes, needles or sharps in a manner that exposed workers and the general public to a health risk [10].

According to study done in Pakistan, medical doctors (MD) and nurses have better knowledge than paramedics and sanitary workers about infectious waste management. Mostly (48%) MDs were aware about the segregation of infectious waste at source as per the WHO guidelines, while this knowledge was found poor in sanitary workers and paramedics. Regarding collection of infectious waste from different areas of the hospital, (63%) doctors had better knowledge as compared to other groups and were found statistically significant [19].

According to study done in Pondicherry shows that <50% of nursing staff and <25% of multipurpose workers had the knowledge of color coding and segregation. It also shows poor knowledge regarding disposal of sharps among multipurpose workers. All the categories of health care workers have good knowledge about infectious diseases transmitted due to improper management of waste and the responses received were, HIV, HBV, HCV, air borne infections, TB [20].

According to study done in Lebanon concerning gender /sex wise females had more awareness about color coding 69% as compared to males 55%. However males had more knowledge (78%) about BMW Management as compared to females (74%) and also practice 79% as compared to females 75% [21].

According to study done in Cairo show that for physicians the percentage with correct knowledge about the use of red disposal bags (60.9%) and sharps boxes (51.8%) and correct Identification of the biohazard symbol (47.3%) was significantly higher than among the other2 study groups ( $P < 0.001$ ). There was no significant difference among the 3 study groups regarding knowledge about the correct content of the black disposal bags ( $P > 0.05$ ). By comparing the total satisfactory knowledge scores, it was found that the percentage of physicians with satisfactory knowledge scores (68.3%) was significantly higher than among nurses (60.9%) and housekeepers (40.4%) ( $P < 0.001$ ) [22].

Study conducted in Gondar indicate that out of the total respondents 206 (55.1%) were knowledgeable [23]. In other study conducted in Gondar on health care waste management practice among health care worker in health facilities show that 78(30%), 99(38.1%) and 83 (31.9%) had higher, moderate and lower knowledge on diseases transmission with healthcare waste, respectively. However, the majority (202, 77.7%), 45 (17.3%) and 13(5%) had low, moderate and higher knowledge on healthcare waste types and color coding containers for healthcare waste and the responsibility of healthcare waste segregation, respectively [24].

### **1.3. Attitudes of health care workers towards hospital waste management.**

According to study in India regarding the attitude towards biomedical waste management, majority of the sanitary staff felt that the management of biomedical waste is not an issue at all and it is purely the responsibility of the institution not individual responsibility. They also felt that the safe management of biomedical waste is an extra burden at work. Majority of the doctors, nurses and lab technicians had the unfavorable attitude of willingness to attend at training program on management of biomedical waste [25].

The study in Thailand show that the attitude for labeling the waste bags was positive in majority of both health staff (88.2%) and waste handlers (89.2%), although, 66.5% of health staff and 91.9% of waste handlers did not label them prior to collection of waste in hospital [26].

According to study done in Pakistan show that majority of the doctors (65%) and nursing staff (60%) had good attitude regarding the waste throw in the proper waste bin at their working area as compare to sanitary workers and paramedics [27].

As another study done in Cairo show that the percentage of physicians agreeing that safe disposal is of at most importance for preventing infection transmission (89.1%) was significantly higher than among nurses (82.1%) and housekeepers (73.0%) ( $P < 0.02$ ).

Moreover, the percentage of physicians agreeing that using personal protective equipment decreases the risk of contracting infection (55.5%) was significantly higher than among nurses (43.0%) and housekeepers (22.5%) ( $P < 0.001$ ) [14].

Study done in Gondar University on hospital waste segregation indicate that Regarding attitude towards health care waste segregation practice 283 (75.7%) of the respondents had positive attitude i.e. who respond above the mean score  $\geq 9$  [13].

#### **1.4. Practices among health care workers on hospital waste management.**

A study in Pakistan done show that Practices of using the waste color coding and segregation of waste were poorly recorded except doctors and nurses they were also not practicing as per the WHO standards [11].

The study done in Cairo show that on observation of health-care workers, significantly more Nurses than physicians correctly disposed of blood-contaminated fomites (84.8% versus 62.7%) ( $P < 0.001$ ) and correctly disposed of general waste (81.5% versus 69.1%) ( $P < 0.02$ ).

Moreover, the percentage of nurses showing satisfactory overall practice scores (84.8%) was significantly higher than that of physicians (67.3%) ( $P = 0.001$ ) [12].

As study done in Gondar town on health care waste management show that HCWs reported that 82 (31.5 %) of them were doing healthcare waste management practice. Two hundred forty two (93%) of the respondents used gloves during handling of health care wastes. Only 106 (40.8%) of respondents treated infectious wastes with sterilization, and disinfection before disposing off. Only eighty three (31.9%) of respondents segregated wastes by type at point of generation. Most of the respondents, 230 (88.5%) used the available waste bins for placing of healthcare waste. Another study done in Gondar indicate that 173 (46.3%) of the respondents had correctly practiced health care waste segregation and healthcare workers who took training on healthcare waste were 2.29 times more likely to practice healthcare waste management than their counter parts who didn't take training on healthcare waste management [AOR: 2.29, 95% CI: (1.24, 4.24)] [13].



### **1.5. Factors associated with healthcare waste management practice**

The study done in Cairo indicate that the variables that could affect KAP scores, it was found that duration of work experience and having ever received training on waste management were not significantly related to satisfactory scores in any of the studied domains among physicians and housekeepers, and training was not related to KAP scores of nurses ( $P > 0.05$ ). The only significant variable was lifetime work experience among nurses; more of those who had worked  $\geq 2$  years had satisfactory knowledge scores (68.7%) than those who had worked  $< 2$  years (47.3%) ( $P < 0.05$ ) [11].

The study done in Gondar town indicate that healthcare institutions type, training on healthcare waste, knowledge on healthcare waste type and knowledge on diseases transmission. Studies shows those who had higher knowledge about the type of healthcare waste were 6.38 times and moderate knowledge was 3.64 times more likely to practice healthcare waste management compared with HCWs who had low knowledge. Healthcare workers who took training on healthcare waste were 2.29 times more likely to practice healthcare waste management than their counter parts who didn't take training on healthcare waste management [11].

The study done in Lebanon showed that the accidental exposure to BBF was more frequent in older HCWs (OR = 3.42;  $p = 0.03$ ), and the more experienced. Subjects working in intensive care unit ward reported more exposure to BBF (OR = 3;  $p = 0.04$ ). Indeed, avoiding to re-cap used needles (OR = -2.36;  $p = 0.04$ ), and avoiding to remove needles with hand before disposal (OR = -2.61;  $p = 0.02$ ), and sharp containers located as close as feasible to the area in which the items are used (OR = -2.12;  $p = 0.04$ ) were significant preventive predictors of the accidental exposure to BBF [20].

## 2.4. Conceptual Framework of the study

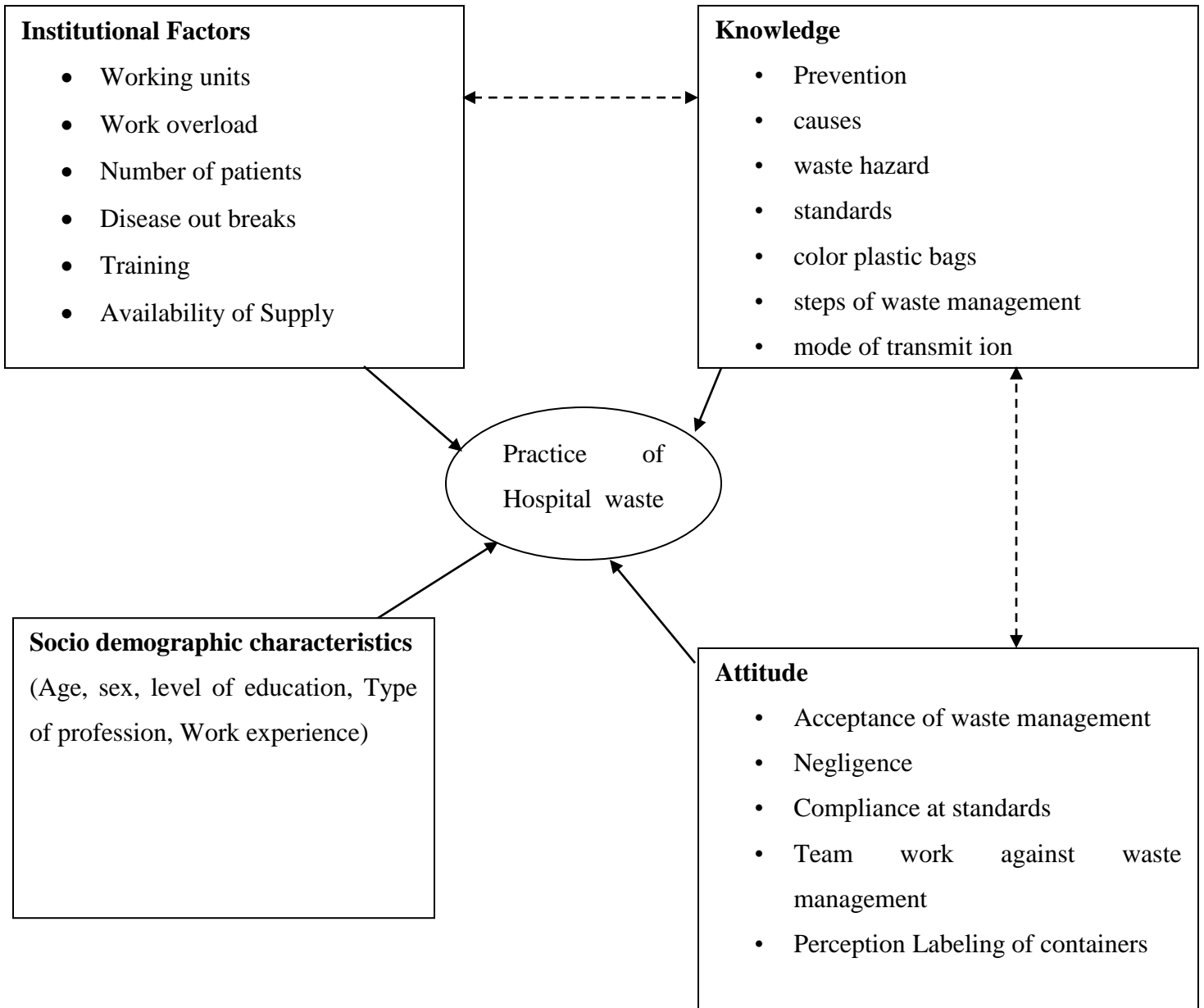


Figure 1: Adapted Conceptual Framework with regard to Practice of Hospital Waste Management in public hospitals of South West Shoa Zone [25].

## **CHAPTER THREE**

### **OBJECTIVES OF THE STUDY**

#### **3.1 General objective of the study**

To assess magnitude practice of hospital waste management and associated factors among healthcare workers of public hospitals in South West Shoa Zone, Ethiopia, 2019.

#### **3.2 The specific objectives of the study**

1. To determine level of hospital waste management practice among health care workers in public hospitals of South West Shoa zone, 2019.
2. To identify factors associated with hospital waste management practice among healthcare workers in public hospital of south west shoa zone, 2019.

## **CHAPTER FOUR**

### **4 Methods and Materials**

#### **4.1 Study area and period**

South west shoa zone is one of the zone among 20 administrative zones in oromia Regional state and the capital town is Woliso located at 114 kms away from the capital city of Ethiopia Addis Ababa in the western part of Ethiopia. They are a total of 4(four) public hospitals and one private hospital. Among the public hospitals, three of them are primary hospitals ( Amaya, Lemen and Bantu ) and one (1) Tullubolo general hospital in the zone. The general hospital is 80 kms away from AA and 35 kms from zonal town Woliso and 206 employees. One of the primary hospitals is Ammaya Hospital which is 30kms away from Woliso and has 125 employees; the other primary hospital is Bantu Hospital with 133 employees and Leman hospital with 124 health care workers. The study was conducted in 4 (four) public hospitals of South west Shoa zone from March 5-30 /2019. [28].

#### **4.2 Study design:**

Institutional based cross sectional study was conducted

#### **4.3 Population**

##### **4.3.1 Source population**

All health care employees who were working in public hospitals of South West Shoa Zone.

##### **4.3.2 Study population**

Randomly selected sample of healthcare workers in 4 (four) public hospitals of south west shoa zone

##### **4.3.3. Inclusion and exclusion criteria**

###### **Inclusion**

All health care workers in the selected public hospitals who work for at least 3 months were included in the study.

###### **Exclusion**

Health care workers who were not available due to any type of leave and serious illness.

## 4.4 Sample size and sampling procedure

### 4.4.1. Sample size determination

A single population proportion formula is used to calculate the sample size considering the assumption of proportion of practice about healthcare waste management was 33% obtained from Hawassa health care waste management research [30].

$$n = [Z_{\frac{\alpha}{2}}]^2 \frac{P(1-p)}{d^2} \quad (1)$$

Where at 95% confidence interval, where,  $Z_{\alpha/2} = 1.96$ ,

P = proportion of healthcare workers practiced healthcare waste management.

d = 5% of marginal error.

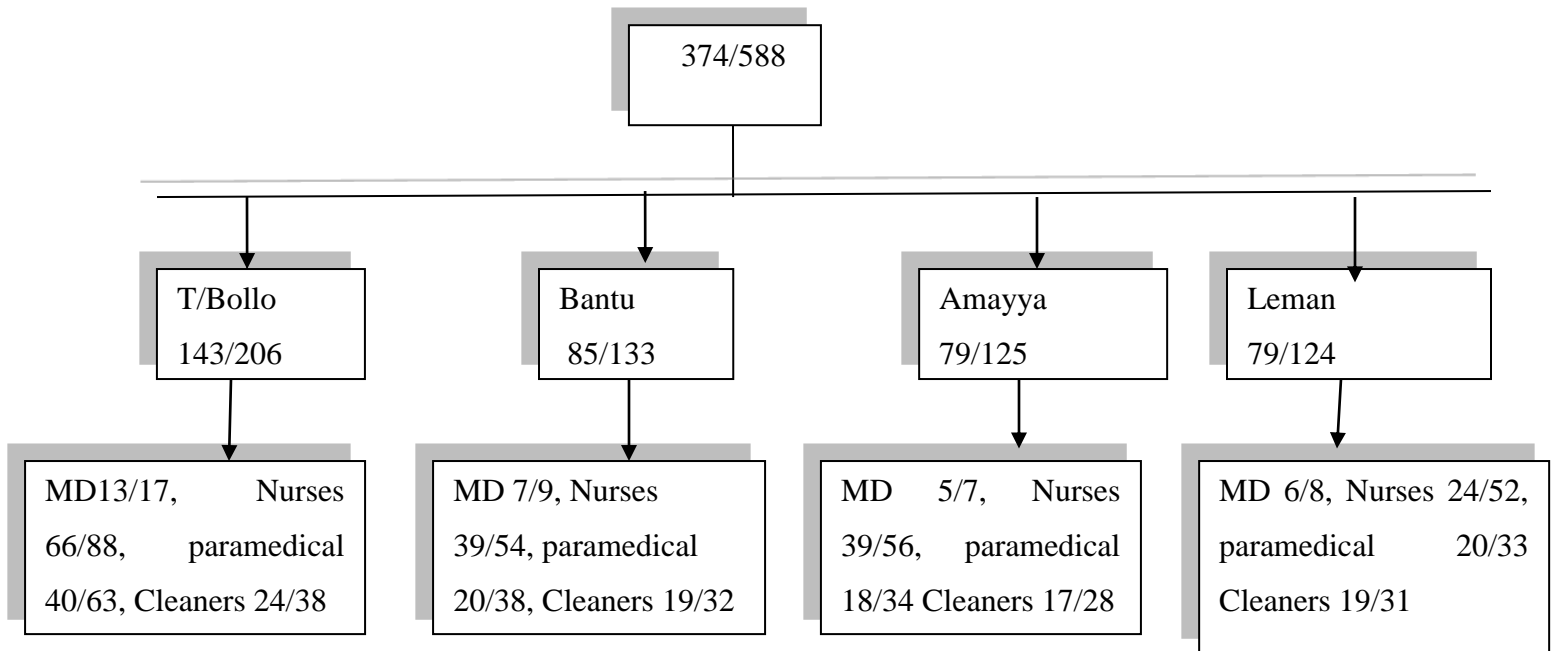
$$n = (1.96)^2(0.33 \times 0.67) / (0.05)^2$$

340

The total sample size was 374 including 10% of non-respondent rate.

### 4.4.2. Sampling techniques

Total number of HCEs in Four public hospitals of the study area was 588 (206, 133, 125, 124) in T/Bollo, Bantu and Ammaya and Leman hospitals respectively who directly involved in waste management. The total number of HCEs to be included from each hospital was determined in proportion with the total number of HCWs found in each hospital. Then further proportional allocation within each hospital was done to address all segments of health care workers. Sampling frame consisting of all HCWs in each hospital obtained from each hospital administration offices and simple random sampling technique was used to select HCWs which was included in the study. Based on the category, 31 Medical Doctors, 168 Nurses, 97 paramedical and 78 Cleaners will be respondents of the study. Working units for observational checklist allocated are Maternal and child health departments, emergency, laboratory, Inpatient department, Pharmacy, Delivery rooms and surgical units, and waste storage area are purposively allocated.



**Figure 2: Source, study population and study unit involved in the study on the assessment practice of healthcare workers towards hospital waste management and its associated factor of SWS zone public hospitals, Ethiopia, 2019.**

#### 4.4.3. Data collection methods/procedures

Data was collected by using pretested, structured self-administered questionnaire with assisted observational checklist which consists of socio-demographic information, knowledge, attitude and practice of health care workers towards hospital waste management. The tool was adapted from related literatures, prepared by English version and modified to the context [23]. It was translated to Afan Oromo and retranslated to English to check its consistence by using language experts. The content validity of the questionnaire was assisted by peer discussion and reliability by using Cronbach's Alpha and it was 0.713, After 6 BSc degree level health workers for data collectors and 3 BSc in health Science supervisors was employed, training was given for one day on clarification of some terms and assessment tools, aim of the study, concerning need for strict confidentiality of respondents information, time of data collection, timely collection and reorganization of the collected data from respective hospital and submission on due time. The observational checklist was used to asses HCW practice during on the task of study subjects by

asking the head of service units about informed consent. Initially, observation was carried out and then self-administered questionnaire was provided to the study subjects.

## **4.5. Variables and measurements**

### **4.5.1. Dependent variables**

Practice of health care employees towards Hospital waste management.

### **4.5.2. Independent variables**

Socio demographic and economic factors include age, sex, educational qualification, marital status, religion, ethnicity, Occupation and work experiences.

Knowledge and Attitude of health care workers

Hospital related factors like working units, Training on waste management and availability of coded material, Availability of PPE material, Injury during hospital waste management, Availability of standard operational procedure in the room towards HCW

## **4.6. Operational definitions**

**Health Care Workers:** Employees who are working in public hospitals of south west shoa zone and directly or indirectly participate in health care waste management like Medical doctors, Nurses, waste handlers , and paramedical professionals.

**Paramedical:** Health professionals whose disciplines are laboratory, Pharmacy, X-ray, Bioengineers, Environmental health and Anesthesia's at different educational levels and are working in public hospitals of south west shoa zone.

**Hospital waste:** Any wastes that are generated in hospital during Treatment, diagnosis, immunization of human beings which consists of biological, chemical and physical hazards

**Knowledgeable:** Participants who answered the knowledge test equations more than or equal to 80% from 15 items adjusted in multiple choice or those who answered ( $\geq 12/15$ ) [33].

**Moderate Knowledge:** Respondents who answer 60-79% of knowledge question from 15 items adjusted in multiple choice ( $< 12/15$ ) and ( $\geq 9/15$ ) [33].

**Low Knowledge:** respondents who answered below 60% from 15 items adjusted in multiple choice ( $> 9/15$ ) [33].

**Favorable attitude:** respondents who scored mean and above mean value for equation of attitude assessment in likert-scale [33].

**Not favorable attitude:** respondents who scored less than mean value for equation of attitude assessment adjusted in likert-scale

**Proper practice:** Those who scored mean and above the mean value of practice assessment equation from 15 items [10].

**Improper practice:** Those who scored less than mean value of practice assessment equation from 15 items.

#### **4.7. Data processing and analysis**

Each questionnaire was checked for completeness, missed values and unlikely responses and then manually cleaned up on such indications. The coded data was entered on to computer using Epi data version 3.1 software, then after data cleaning, it was exported to SPSS version 25. Statistical summary such as frequency, proportion, mean and standard deviation was computed. Bi-variate and multivariate logistic regression analysis was used to determine the association between independent and outcome variables. Bi-variate analysis provide candidates of potential independent predictors with  $p < 0.25$  to multivariable logistic regression analysis. 95% Confident interval and AOR (Adjusted Odd Ratio) was used to determine the strength of association between variables and Results was interpreted as association if  $p < 0.05$ . Hosmer and Lemshow test was used for Model fitness and it's result was  $\chi^2 = 4.8$  and p value of 0.2

#### **4.8. Data quality management**

The questionnaire was prepared originally in English and translated to Afan Oromo and back to English by using English and Afan Oromo teachers to ensure the accuracy of the questions. Training was given for data collectors and supervisors. In order to conduct Pre testing of questionnaire, 5% was made to assess the consistency of the questions at Ambo general hospital which was not included in the study. Basic correction was obtained on 8 items of assessment tools. On spot checking and reviewing the completed questionnaires was made by principal investigator and supervisors on daily bases to ensure completeness and consistency of the information collected.

#### **4.9. Ethical consideration**

Ethical clearance was obtained from ethical review of committee Institute of Health Jimma University graduate studies program. Additionally official letters of permission was obtained from South West Shoa zone health office and the respective hospitals. Objective of the research



was explained to all study participants (health care workers) and also confidentiality was maintained. Response of respondents `was anonymous and supervisor informed study participant that they had full right to discontinue or refuse to participate in the study. Informed verbal consent was also obtained from respondents

#### **4.10. Dissemination plan**

The finding of the study was submitted to Jimma University. It was available in the library to serve as a reference material for students, researchers, experts or policy makers for intervention. This result also was disseminated for publication in peer reviewed local and international journals and presenting in related conferences and seminar

## CHAPTER FIVE: RESULT

### 5.1. Socio Demographic character of the respondent

A total of 336 health care workers have participated in the study. Response rate was 90%. The facilities of the participant were 117 from Tullu Bollo general hospital, 77 Bantu primary hospital, 70 Ammayya primary hospital and 72 were from Leman primary hospital. One hundred ninety (56.5%) study subjects were males. The mean age of the respondents were 27.76 years ranging between 20 and 42 years. Majority of the respondents 192 (57.1%) were between the ages of 30-39 years old and 184 (54.8%) of the respondents married. By profession the majority of respondents were Nurse 148 (44.3%). Two hundred thirty two (69%) respondents were Bsc Degree in their educational level. Regarding their work experience 244 (72.6%) served for less than 5 years

**Table 1. Socio demographic characteristics of health care workers in South West Shoa zone hospitals, May, 2019. (N=336)**

Variable		Frequency	Valid Percent
<b>Sex of respondent</b>	Male	190	56.55
	Female	146	43.45
<b>Marital status</b>	Married	184	54.70
	Single	135	40.18
	Divorced	15	4.46
	Widowed	2	0.6
<b>Age group of the respondents</b>	20-29 Years	86	25.6
	30-39 Years	192	57.1
	40-49 Years	58	17.3
	>=50Years	0	0.0
<b>Educational status of respondents</b>	Degree	232	69.0
	Diploma	81	24.1
	Secondary school	16	4.8
	Post graduate	7	2.1
<b>Profession of the respondents</b>	Medical Doctors	26	8
	Nurse	148	44
	Paramedical	91	27
	Cleaners	71	21
<b>Religious of the respondents</b>	Orthodox	148	44.2
	Protestant	129	38.5
	Wakefata	42	12.5
	Muslim	12	3.6
	Other	4	1.2

<b>Work experience of the respondents</b>	<5 Years	243	72.5
	6-10 Years	71	21.2
	>=11Years	21	6.3
	ART/MCH/XRay	61	18.2
	Out Patient Department	53	15.2
	In patient Department	41	12.2
	Ward	38	11.3
	Pharmacy	34	10.1
	Delivery	30	8.9
	Laboratory	29	8.6
	Emergency	27	8
	OR	23	6.8

## 5.2. Knowledge of healthcare workers of Hospital waste management

The overall score of knowledge in practice of health care waste management by healthcare personnel was 67.69%. Out the healthcare personnel interviewed 58(17%), 174 (52%) and 104 (31%) scored the overall knowledge of health care waste management practice of  $\geq 80\%$ , 60-79% and  $< 60\%$ , respectively.

Regarding the knowledge of the respondent's majority of them 293 (87.2%) was correctly response as safety boxes should be closed at 3/4 full. Among respondents, 146 (43.45%) of them knew all healthcare wastes were not hazardous. Medical Doctors 16(64%) and paramedical 53(58.2%) have more knowledge than nurses 63(18.8%) and cleaners 14 (19.72%) that all health care wastes were not hazardous. From the total respondents 209 (62.2%) knew paper waste put in black plastic bag and only 107 (38.5%) knew infectious waste put in yellow plastic bag.

**Table 2: Knowledge of healthcare workers towards practice of hospital waste management in hospitals of south west shoa Zone May, 2019. (N=336)**

Variable	MD n=26	Nurse n=148	Paramedical n=91	Cleaner n=71	Total n=336
	Freq (%)	Freq (%)	Freq (%)	Frq (%)	Fre (%)
All healthcare wastes are not hazardous	16 (64%)	63(18.8%)	53(58.2%)	14(19.72%)	146(43.45%)
know composition of hazardous waste as 10-25%	18 (72%)	64(19%)	39(42.9%)	23(32.39%)	144(42.86%)
know paper wastes in black bag	20(80%)	98(29.2%)	49(53.8%)	42(59.16%)	209(62.2%)
know infectious waste put in yellow plastic bag	8(32%)	42(12.5%)	35(38.5%)	22(30.99%)	107(31.85%)
Know container for sharp wastes in puncture proof safety box	9(36%)	42(12.5%)	37(40.7%)	28(39.44%)	116(34.52%)
know safety boxes should closed at 3/4 full	22(88%)	127(37.8%)	81(89%)	63(88.73%)	293(87.2%)
Know first step of waste management	16(64%)	66(19.6%)	37(40.7%)	38(53.52%)	157(46.73%)
know recommended waste management for sharp is incinerator	18(72%)	109(32.4%)	62(68.1%)	38(53.52%)	227(67.56%)
Know diseases caused by contaminated needles	26(100)	107(32.1)	62(68.1)	44(61.97)	239(71.13%)
know hazardous waste requires separate treatment	21(80)	124(37.2)	78(85.7)	65(91.55)	288(85.71%)
Know glassware, metallic body, vials and ampoules put in Blue bag	13(48)	80(23.8)	46(50.5)	26(36.62)	164(48.81%)
know frequency of wastes removed from source of origin always with in 24hrs	19(76)	83(24.7)	57(62.6)	37(52.11)	196(58.33%)
Know health care waste handlers should be aware of risks and use PPEs	20(80)	90(26.8)	61(67)	58(81.69)	229(68.15%)
know untreated HCW stored not beyond 24 hrs	20(80)	118(35.1)	75(82.4)	62(87.32)	275(81.85%)
Know to whom report encountered injury	21(84)	101(30.01)	76(83.5)	60(84.51)	258(76.79%)

### **5.3. Attitude of healthcare workers toward hospital wastes management**

From respondent participated in the study 258(76.79%) agree to safe waste management of health care waste is issue of health care workers and 318(94.64%) agree to safe health care waste management is important in hospital. Among respondents 183 (54.4%) health care workers agreed on the idea safe hospital waste management decrease the financial burden of hospital. From the total participants those who scored mean and above mean ( $\geq 6.08$ ) with SD 1.54 were 149(44.3%) have positive attitude toward hospital waste management and 187(55.7%) had negative attitude toward hospital waste management.

**Table 3: Attitude of healthcare workers towards hospital waste management of South West Shoa Zone hospitals May, 2019.(N=336)**

Characters	MD n=26		Nurse n=148	Paramedical n=91	Cleaner n=71	Total N=336
	Freq	(%)	Freq	(%)	freq	Fre
Believe Safe management of HCW is an issue at all	yes	23(92.5)	107(71.81)	70(76.92%)	58(81.7%)	258(76.79%)
Believe proper waste management is important in hospital	yes	26(100%)	140(93.96%)	88(96.70%)	65(91.5%)	318(94.64%)
Believe HCW is properly done in their service unit	yes	12(48%)	96(64.43%)	64(70.33%)	46(64.8%)	218(64.8%)
Believe Waste management is a team work	yes	19(76%)	123(82.85%)	71(78.02%)	8(11.3%)	221(65.7%)
Believe Safe management efforts by the hospital without financial burden	yes	12 (48%)	75 (50.34%)	48 (52.75%)	48(67.6%)	183 (54.4%)
Safe management of HCW is not an extra burden on work.	yes	21 (84%)	108(72.48%)	64 (70.33%)	49(69%)	242(72.02%)
Believes workplace has opened necessary courses on HCWM	yes	17(68%)	116(77.85)	66(72.53%)	63(88.7%)	262(77.98%)
Feels ready to participate in training on MW management	yes	21(84%)	110(83.73%)	76(83.52%%)	66(93%)	273(81.25%)
Believes health authorities must be informed on breaches in relation to HCWM	Yes	22(88%)	120(80.54%)	73(80.22%)	59(83.1%)	274(81.55%)

#### 5.4. Practice of Health care workers on hospital waste management

Among 336 health care workers 177 (62.8%) respond that they report to higher authority if injured by sharp wastes. Medical doctors 18(69%) and paramedical 61(67%) were more reported than nurses 88 (59%) and cleaners 44(62%). Poor practice was observed indisposing pharmaceutical waste 33(9.8%) and items contaminated by blood into yellow color plastic bag were 118 (35.1%). From the total respondents those who scored mean and above mean value (> 6.416) were 160 (47.6%) proper practice of hospital waste management and 170 (52.3%) had improper practice hospital waste management (table 4). HCWs whose profession Medical Doctors, Nurses, paramedical and cleaners scored mean and above mean value were 69%, 39%, 53% and 49 % respectively.

**Table 4: Practice of Healthcare workers on hospital waste management of south west shoa Zone Hospitals May, 2019. (N=336)**

Variables	MD n=26	Nurse n=148	Paramedical n=91	Cleaner n=71	Total N=336
Put needle into a special box	16(62%)	70(.47%)	51(56%)	31(44%)	168 (50%)
Consider as hazardous if wastes accidentally mixed	15(58%)	73 (49%)	48 (53%)	25(35%)	161(47.9%)
Put infectious wastes into a special box	14(54%)	69(47%)	51(56%)	29 (41%)	163 (48.5%)
Proper segregation of medical waste	14(54%)	70(47%)	43(47%)	36(51%)	177 (48.5%)
Labeling bin for different types of waste	12(46%)	80(54%)	48(53%)	37(52%)	177 (52.7%)
Informed higher authority if injured by sharp	18(69%)	88(59%)	61(67)	44(62%)	211 (62.8%)
Remove as hazardous if not identify correctly	19(70%)	69(47%)	38(42%)	41(58%)	167 (49.7%)
Proper disposal of cotton, gauze and other items contaminated by blood?	15(58%)	45(30%)	31(34%)	27(38%)	118 (35.1%)
Where do you dispose pharmaceutical waste?	15(58%)	60(41%)	42(46%)	28(39%)	33 (9.8%)
Not Bending/burning/crushing the used needles	10(38%)	55(37%)	45(49%)	41(58%)	151 (49.9%)
Have you ever read HCWM guideline?	15(58%)	60(41%)	42(46%)	28(39%)	145 (43.2%)
Are you using personal protecting equipment while handling medical waste?	10(38%)	52(35%)	38(42%)	27(38%)	127 (37.8%)
Proper collecting used disposable plastic items?	11(42%)	52(35%)	35(38%)	31(44%)	129 (38.4%)
Is the health care waste store for less than 24 hours? Before being treated / disposed of?	13(47%)	63(43%)	33(36%)	12(17%)	121 (36%)
Do you practicing proper transferring medical waste?	16(62%)	46(31%)	31(34%)	41(29%)	134 (39%)

In addition to self-administered of the respondents, it was observed that from a total of 32 service units in each hospitals 17 (53%) were used a puncture proofing container to put sharps and immediately put needles in to the available safety boxes. Out the units 14 (40.63%) HCWs used proper practice of waste segregation. It was observed in majority of units that they did not separate and put in to color coded plastic bin/bags. There were no copies of HCWM guidelines observed in almost all working units, but the national health care waste management was available at hands of infection prevention committees of two hospitals. Almost in all hospitals there were no temporary storage area observed and stayed for more than 12 hrs at generation point which was beyond WHO recommendation. Regarding safety of workers it was observed that among PPE like latex gloves, heavy-duty gloves and aprons were available in all of the surveyed hospitals, but almost half of cleaners were not properly used heavy- duty gloves during waste handling.

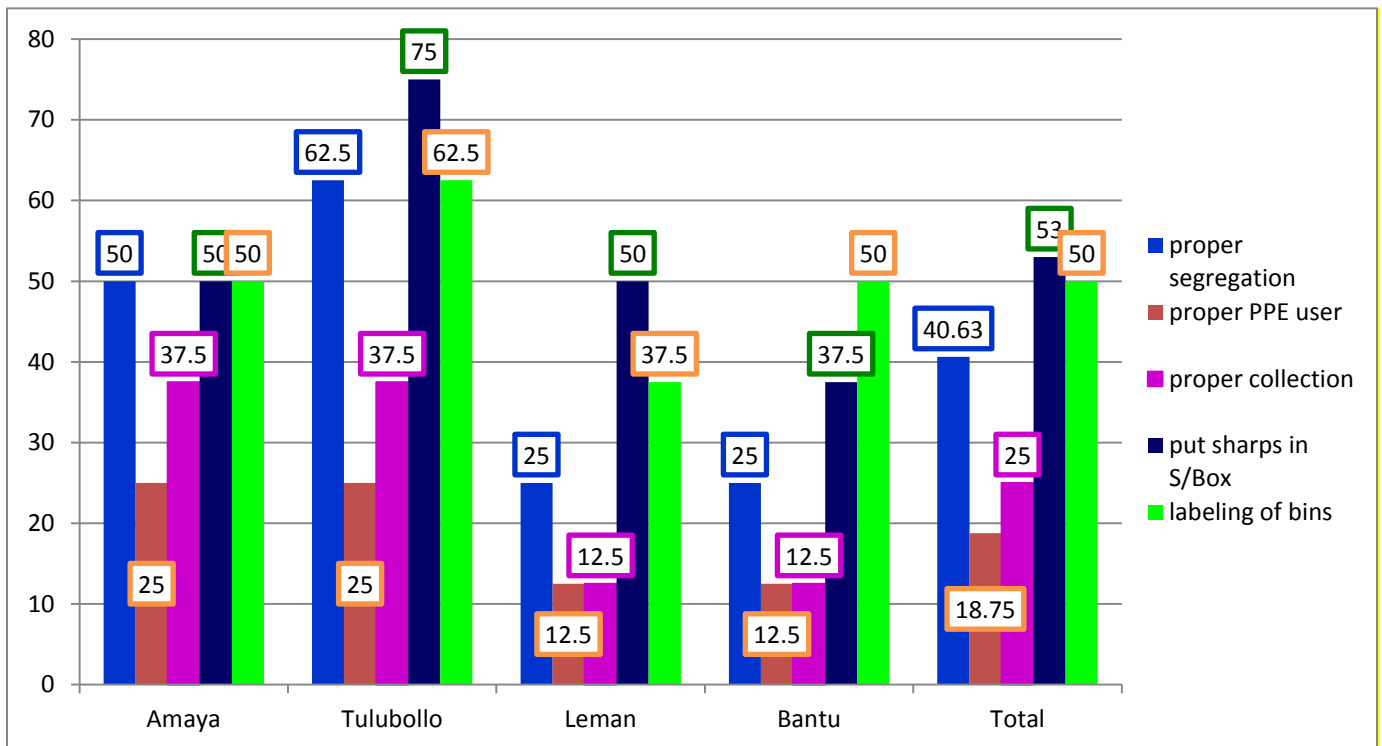


Figure 3: Observational practice of HCWs on Hospital waste management in the 4 hospitals of SWS zone, 2019



## 5.6 Hospital barriers on the practice of health care waste management.

From the total surveyed health care workers, majority 206 (61.3%) were responded as there were a problem/barriers in the hospital to implement a proper hospital waste management as per the WHO slandered. Among the respondents only 120 (36%) received training on HCWM and 163 (48.51%) had used a copy of HCWM guidelines. Majority 253 (75.3%) of the respondents provide a positive answer for the availability of PPEs in the hospital but only 169 (50.3%) of health care workers responded that the adequacy of color coded waste bags in the hospital.

**Table 5: Hospital barriers on Practice of Healthcare workers on hospital waste management of south west shoa Zone Hospitals May, 2019. (N=336)**

Variables		fre	%
Do you receive training on HCWM	Yes	120	36.01
Does the facility have a person/committee/unit in charge specific to HCWM?	Yes	182	54.17
Does your facility provide hepatitis B vaccination for health care workers and waste handlers?	Yes	297	88.39
Do you have a copy of any guidelines/standards/manuals on HWM	Yes	163	48.51
Are waste handlers provided with personal protective equipment?	Yes	253	75.3
Does your facility provide enough waste bins/coded bags?	Yes	169	50.3
Is work is loaded for you?	Yes	174	51.79

## 5.5. Factors associated with Hospital waste management practice among Health care workers of South West Shoa zone hospitals, May, 2019

From Bivariate logistic regression analysis the variables with  $P \leq 0.25$  were candidate for multivariate logistic regression. In bivariate logistic regression analysis, hospital related factors like training, supply of color coded bags and PPEs, availability HCWM guidelines, work over load, and knowledge category were potential candidates for multivariate logistic regression analysis. Table 6

From multiple logistic regressions, it was found that knowledge category and training were significantly associated with the practice of hospital waste management. The result of this study showed that HCW who are categorized as knowledgeable were 2 times more likely to

practice proper health care waste management than health care workers categorized as low knowledge {(AOR: 2.315, 95% CI. (1.133, 4.732))} and those categorized as moderate were 2 times more likely to practice proper health care waste management than health care workers categorized as low knowledge {(AOR: 2.416, 95% CI. (1.398 - 4.176))}.

Health care workers who took training {(AOR: 3.958, 95% CI. (2.390 – 6.540))} were 4 times more likely practiced hospital waste management than health care workers did not took training on HCWM.(Table 7)

**Table 6: Bivariate analysis for factor associated to hospital waste management practice of health care workers in South West Shoa Zone hospital, May 2019.**

Variables	Dependent practice of respondent			COR(95%CI)	P value
		proper practice	improper		
Sex of respondent	Female	70(21%)	76 (23%)	1	0.931
	Male	90 (27%)	100 (29%)	1.019 (0.662 - 1.570)	
Educational status of respondents	<=diploma	51(15.2%)	46 (13.7%)	1	0.308
	>=degree	109 (32.4%)	130 (38.7%)	1.278 (0.797 - 2.051)	
PPE	Yes	33(9.8%)	50 (14.9%)	0.594(0.358-0.985)	0.043*
	No	127 (37.8%)	126 (37.5%)	1	
Work overload	yes	69(20.5%)	83 (24.7%)	1	0.028*
	no	91 (27.1%)	93(27.7%)	0.616 (.400-0.948)	
Waste bins	Yes	90 (27.1%)	79 (23.2%)	0.634 (0.412-0.975)	0.038*
	No	70 (21.1%)	97 (28.6%)	1	
Knowledge	Knowledgeable	33 (9.8%)	25 (7.4%)	2.470 (1.276- 4.783)	0.007*
	Moderate	97(28.9%)	77 (22.9%)	2.774 (1.666-4.621)	0.000*
	poor	30(8.9%)	74 (22%)	1	
Training	Yes	85(25.3%)	35 (10.4%)	4.384 (2.707 – 7.100)	0.000*
	No	75 (22.3%)	141 (42%)	1	
Guideline availability	Yes	85(25.3%)	78(23.2%)	0.551 (0.357, 0.849)	0.007*
	No	75(22.3%)	98 (29.2%)	1	

\* shows variables with p value < 0.25 were candidates for Multivariate regression analysis

**Table 7: Multiple logistic regression analysis of factors associated with hospital waste practice among health care workers in south west Shoa zone hospital, 2019 Ethiopia**

Factors			Practice of respondents		P value	AOR (CI 95%)
			Proper (n= 160)	Improper (n=176)		
Guidelines	YES		85(25.3%)	78(23.2%)	0.159	0.690 (0.412-1.157)
	NO		75(22.3%)	98 (29.2%)		1
	Knowledgeable		33(9.8%)	25(7.4%)	.021	2.315 {(1.133-4.732)}*
	moderate		97(28.9%)	77(22.9%)	.002	2.416 [(1.398-4.176)]*
	Low		30(8.9%)	74(22%)		1
Training		yes	77(22.9%)	139 (28.9%)	0.000	3.954 [(2.390- 6.540)]*
		No	85 (25.3%)	35 (10.4%)		1
PPE		Yes	33(9.8%)	50 (14.9%)	0.382	0.778 (0.444 - 1.365)
		No	127 (37.8%)	126 (37.5%)		1
Work overload		yes	69(20.5%)	83 (24.7%)	0.053	0.613 (0.373 – 1.007)
		No	91 (27.1%)	93(27.7%)		1
Waste bins		yes	90 (27.1%)	79 (23.2%)	0.769	0.926 (0.555 - 1.517)
		No	70 (21.1%)	97 (28.6%)		1

- \*statically significant association at p value < 0.05

## 5.6. Observation finding

Hospitals service units/areas which were expected to generate more hospital wastes every time have undergone for observation was medical wards, emergency, maternity, Maternal and child units, and laboratory and ART units.

Results from observational checklists revealed that all surveyed hospitals had inadequate color coded containers and plastic bags for healthcare wastes collection but in all hospitals there were safety box for collection of sharp and needle waste. The overall site observation in all surveyed hospitals had no adequate and appropriate labeled containers for collection of healthcare waste.

HCWs who were working in emergency units of 3 hospitals used all types of wastes in the available containers which was overfilling and thrown on floor was observed. Improper waste segregation among HCWs through using color coded containers was not adequate. There was no any guide line for healthcare waste management in 2(two) hospitals. The type of healthcare waste transportation methods employed by hospitals and other human related healthcare activities was surveyed. It was found that healthcare wastes were transported manually to the backyard disposal site of all hospitals.

In general, means of transportation of healthcare waste in all hospitals were not in line with the WHO recommended standard. The waste was treated on-site by using either open burning or controlled incineration in all surveyed hospitals. All surveyed hospitals used open burning to treat dressing materials and all used incinerators to treat sharp wastes. It was found that all surveyed hospitals didn't have a temporary storage area for healthcare wastes.

Improper waste collection and transferring system among HCWs were observed. Healthcare wastes were stayed in each section of hospitals and took to the back yard disposal site. However, in maternity section of all hospitals pathological wastes were taken into placenta pit after the healthcare services had been completed.

## **CHAPTER SIX: DISCUSSION**

### **6.1. Discussion on practice of health care workers on hospital waste management**

The discussion obtained from the analysis conducted on the data that were collected using structured self-administered questionnaire, observational checklist as well as in view of the objectives that in this study of hospital healthcare workers, assessed the Practice and associated factors towards hospital waste management. As this study revealed that 47.6% of healthcare workers of south west shoa zone hospitals were doing proper healthcare waste management practice where as 52.4% perform improper healthcare waste management practice. This finding is greater than other study conducted in Gondar town health institute on healthcare waste management practice among healthcare workers 31.5% of them were doing healthcare waste management practice [10]. But it was less than the study done in Nigeria on knowledge attitude and practice of health staff and waste handlers show that 60.2% [26]. Only 121 (36%) of the respondents took training on hospital waste management and occupationally, about 3(181.5%) Medical doctors, 37(25%) Nurse, 24(26%) paramedical and 58(82%) cleaners took training on hospital waste management. This study is lower than study done in Namibia on healthcare workers to ward segregation of hospital waste, Doctors who were trained only 4(20.0%), Nurses were 17(32.1%), ward assistants 4 (57.1%) and cleaners who trained were 18(90.0%) [31]. This difference might be due to the socio demographic difference in the two countries. Healthcare waste refers to all the waste generated by healthcare establishment. It estimated that 10-25% of the healthcare waste is hazardous. As this study shows 146 (43.45%) knew that all healthcare wastes are not hazardous. This study is less than the study which was done in India about 75% of the respondents were conceder all health care wastes are hazardous. This difference might be the time difference and training was more given in the previous study than this study.

Hospital barriers of the respondents were assessed for the practice of healthcare waste management. About 206 (61.3%) Health care workers were reported that there was a problem related to hospital. Availability of supplies like PPE 253 (75%) and color coded waste containers in each hospital was 169 (50.3%) inadequate. Guidelines related to hospital waste management 166 (49%) was used by HCWs in surveyed hospitals. This study result was more than the study conducted in Gonder and nearly similar to the study conducted in South Africa. Observational part

of this study confirmed that there were no copies of guidelines in observed units of 2(Two) namely Bantu and Leman hospital and there were also inadequate color coded waste bins in service units.

As this study showed that only 168(50%) of healthcare workers dispose needle and sharp waste in puncture proofing containers or special box. This finding is less than the study done in India 56.8% of healthcare workers dispose sharp waste in puncture proofing container [7]. This difference might be due to time difference. About 37.5% of the respondents disposed all kinds of waste into general waste bins. This result in contrast with a study conducted in India where the corresponding figure was 18% [7].

About 69% of Medical doctor and 39% of Nurse were practiced hospital waste management. This study is in contrast with the study done in Cairo which is 84.8% of Nurse and 67.3% of medical doctor are practiced hospital waste management [20]. This difference might be due to socio demographic difference of the country. Health care workers who took training {(AOR: 3.958, 95% CI. (2.390 – 6.540))} were 4 times times more likely practiced hospital waste management than health care workers did not took training on HCWM this study was higher than the study conducted in Gonder that HCWs who took training on healthcare waste were 2.29 times more likely to practice healthcare waste management than their counter parts who didn't take training on healthcare waste management[11].

## **6.2. Limitation of the study**

The study was not be comprises health care workers in the private hospitals that lack generalization. The information presented by participants is based upon their subjective perceptions. Social desirability and observational bias might be considered during data collection through self-administered questionnaires and observational check list

## **CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION**

### **7.1. CONCLUSION**

It can be concluded from the present study that the practice of healthcare workers towards hospital waste management in South west shoa Zone hospitals was very low. Most of participants had low knowledge and training on HCWM was not properly given to HCWs. There was a felt need for training and reorientation training workshops on hospital waste management.

### **7.2. RECOMMENDATION**

Hospitals have to strengthen the practice of health care workers on standard hospital waste management though developing their skill on practice from point of generation to final disposal and treatment.

HCWs in each hospital should be well trained at hospitals about HCWM and regularly updated with pre-employment and on job specialized training should be given, which provides them with a knowledge base about the process of waste management and associated health risks.

Hospitals have to conduct a regular supportive supervision for each service units to improve the current practice of hospital waste management.

Hospitals have to provide adequate supplies like personal protective equipment and color coded waste containers.

Health care waste management Guidelines prepared by Federal ministry of health should be available at every service units and follow up for proper utilization by the organized hospital committee.

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## Annex 2: Questionnaire

QUESTIONNAIRE FOR ASSESSING THE PRACTICES OF HOSPITAL WASTE MANAGEMENT AND ASSOCIATED FACTORS AMONG HEALTH CARE WORKERS OF PUBLIC HOSPITALS IN SOUTH WEST SHOA ZONE.

Jimma University public health institute

Individual consent format.

For the study on Practice of hospital waste management among health care workers and its associated factors in SWS zone Hospitals. To attain this purpose, your genuine participation in filling the questionnaire with real information is very important and highly appreciated. I would like to assure you, your name will not be written on this form and all the information gathered will be kept strictly confidential. You have full right to refuse to take part of, or to interrupt the study at any time. But the information that you will give us is quite useful to achieve the study and to bring change in health services rendered by professionals working. Thank you! Are you willing to participate? No/Yes

Researcher: Kassahun Tolesa

Institution: Jimma University

The following questionnaire is part of a study to be conducted to explore Practice and associated factors of health care workers on waste management at four public hospitals, in SWS zone, Ethiopia.

**Part One:** Socio demographic characteristic of Healthcare Workers towards Hospital Waste Management and Its Associated Factors in SWS Zone Hospitals, Ethiopia, 2019

Identification code: .....

Q No	Question	Alternative choice and coding categories	Skip to
101	Gender of respondent	Male----- Female-----	
102	What is your current age?	_____years	
103	Religion	Orthodox-----1 Muslim-----2 Protestant-----3 Catholic-----4	

		Other-----5	
104	Educational status	Secondary school-----1 Diploma-----2 Degree-----3 Specialist-----4	
105	Marital status	Single-----1 Married-----2 Divorced-----3 Widowed-----4	
106	What is your profession?	_____	
107	Duration of current work experience	Less than 5 years-----1 More than 5 years-10 years--2 More than 10 years-----3	
108	Which ward /department do you working in?	_____	

Part two: knowledge of health care workers on waste management at four public hospitals (please circle the number of your choice).			
201	Are all healthcare wastes are Hazardous?	Yes-----1 No-----2	
202	If No, for Q201 what is the composition?	10-25%-----1 75-90%-----2 I don't know-----3	
203	In which plastic bag waste papers and paper plates Put in?	Black-----1 Yellow-----2 Green-----3 Red-----4	
204	In which plastic bag for infectious or bio hazardous wastes, e.g. body parts, bandages, gauze,	Black-----1 Yellow-----2 Green-----3	

	catheters and urine Drainage bags?	Red-----4 Other (specify)-----5	
205	Which container for Syringes and needles?	In a puncture-proof safety box----1 In an open container for the blood to get dry from needle-----2 In a dustbin in patients rooms----3	
206	In order to prevent needle sticks, the safety boxes should be closed, how full Should it be?	½ full-----1 3/4 full -----2 100% full-----3	
207	Which is the first step of waste management do you know?	Segregation-----1 Collection-----2 Storage-----3 Transport-----4 Disposal-----5	
208	What types of waste management for sharp waste do you know?	Incineration-----1 Burring-----2 Recycling-----3 Reusing-----4	
209	Which diseases can be caused by contaminated needles?	Hepatitis A-----1 Hepatitis B-----2 Other specify-----3	
210	Medical waste is highly hazardous than municipal waste and therefore requires separate treatment	True-----1 False-----2	
211	Glassware , metallic body implants are disposed in	Blue -----1 White -----2 Don't know-----3	
212	How frequently are wastes removed from source of origin?	Always-----1 Daily-----2 Weekly-----3	

213	Healthcare waste handlers should	Be made aware of risks involving in handling HCWs-----1 Use PPEs-----2 Both are answers-----3	
214	Untreated HCW stored not beyond	24 hr-----1 48hr-----2	
215	Do you know to whom report if encountered injury?	Yes-----1 No-----2	

Part three: attitude of health care workers on practice of hospital waste management at Four hospitals of south west shoa zone. Circle if you agree “yes” and if disagree ‘No’

301	Safe management of health care waste is not an issue at all.	Yes-----1 No-----2	
302	Do you believe proper waste management is important in hospital?	yes-----1 No-----2	
303	Do you believe HCW is properly done in your service unit?	Yes-----1 No-----2	
304	Waste management is team work/no single class of people is responsible for safe management.	Yes-----1 No-----2	
305	Safe management efforts by the hospital increase the financial burden on management.	Yes-----1 No-----2	
306	Safe management of health care waste is an extra burden on work.	Yes-----1 No-----2	
307	Believes workplace has opened necessary courses on HCWM	Yes-----1 No-----2	
308	Feels ready to participate in training on MW management	Yes-----1 No-----2	

309	Believes health authorities must be informed on breaches in relation to HCWM	YES-----1 No-----2	
-----	------------------------------------------------------------------------------	-----------------------	--

Part four: Practice of health care workers on waste management at four public hospitals (please circle the number of your choice).

401	Do you Put needle into a special box	Yes-----1 No-----2
402	Do you Consider as hazardous if wastes accidentally mixed	Yes-----1 No-----2
403	Do you Put infectious wastes into a special box	Yes-----1 No-----2
404	Do you Sort out medical waste correctly	Yes-----1 No-----2
405	Do you Labeling the bin for different types of waste	Yes-----1 No-----2
406	Informed higher authority if injured by sharp	Yes-----1 No-----2
407	Remove as hazardous if not identify correctly	Yes-----1 No-----2
408	Where do you dispose cotton, gauze and other items contaminated by blood?	Red plastic bag-----1 Yellow plastic bag-----2 General garbage-----3 Blue plastic bag-----4 Puncture poof-----5 Black plastic bag-----6
409	Where do you dispose Pharmaceutical waste?	Red plastic bag-----1 Yellow plastic bag-----2 General garbage-----3 Blue plastic bag-----4

		Puncture poof-----5
		Black plastic bag-----6
410	Bending/burning/crushing the used needles	Yes-----1 No-----2
411	Have you ever read HCWM guideline?	Yes-----1 No-----2
412	Are you using personal protecting equipment while handling medical waste?	Yes-----1 No -----2
413	Are you Practicing correct method for collecting used disposable plastic items?	Yes-----1 No-----2
414	Is the health care waste store for more than 24 hours? Before being treated / disposed of?	Yes-----1 No-----2
415	Do you practicing proper transferring medical waste?	Yes -----1 No -----2

Part five: hospital related factors questioner

Se. no	Hospital related question	Yes	No
1	Do you receive training on Health Care Waste Management (HCWM)?		
2	Does the facility have a person/committee/unit in charge specific to HCWM?		
3	Does your facility provide hepatitis B vaccination for health care workers and waste handlers?		
4	Do you have a copy of any guidelines/standards/manuals on health care waste management		
5	Are waste handlers provided with personal protective equipment?		
6	Does your facility provide enough waste bins/coded bags?		
7	Is work is loaded for you?		



### ANNEX 3: OBSERVATIONAL CHECKLIST

OBSERVATIONAL CHECKLIST FOR ASSESSING THE PRACTICES OF HOSPITAL WASTE MANAGEMENT AND ASSOCIATED FACTORS AMONG HEALTH CARE WORKERS OF PUBLIC HOSPITALS IN SOUTH WEST SHOA ZONE

Jimma University Institute of Health

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

Name /Code of data collector's \_\_\_\_\_

Name of service/work unit \_\_\_\_\_ Date of Observation  
\_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Ser. no	Variable	Yes	No
A	Regarding waste containers		
1	Is black colored waste bin available in the service units		
2	Is yellow colored waste bin available in the service units		
3	Is blue colored waste bin available in the service units		
4	Is red colored waste bin available in the service units		
5	Are waste bins covered		
6	Are biohazard symbol imprinted over waste bins		
7	Are posters to guide the users displayed near waste bins		
B	Regarding waste segregation		
8	Does black waste bin contain only general waste?		
9	Does yellow waste bin contain only soiled infected waste?		
10	Does a red bag contain only plastic waste?		
11	Does blue waste bin contain only sharps waste?		
C	Sharps waste		
12	Are used needles found re-capped?		
13	Are used needles found bent?		
14	Are used plastic bottles cut?		
D	Disinfection of plastic and sharps		

15	Is disinfectant solution put into red containers		
16	Is barrel and plunger of syringes separate before immersion in to disinfectant solution?		
E	Waste storage		
17	Is there temporary storage place for health care waste in the hospital?		
18	Is there a specific mark showing the storage area of medical wastes inside the hospital?		
19	Is the health care waste store for more than 24 hours? Before being treated / disposed of?		
20	Are containers identified for specific kind of wastes?		
21	Are waste containers or sacks easily transferable?		
22	Does waste remove as hazardous if not identify correctly		
23	Is the storage area inside the hospitals closed and protected well?		
24	Is there any equipment for transferring medical waste?		

## **Thesis approval form final**

I, the undersigned, hereby declare that this thesis is my original work. The work has not been presented for degree in any university and source of materials used for the project has been acknowledged.

Student's Name: **Kassahun Tolesa**

Signature \_\_\_\_\_

Date \_\_\_\_\_

### **Approval of Internal Examiner:**

Internal Examiner's Name: Dejene Melese (BSC, MPH)

Signature \_\_\_\_\_

Date \_\_\_\_\_

### **Approval of 1<sup>st</sup> advisor:**

Name: **Tesfamichael Alero (BSc-PH, MPH-HSM, MSc in Medical Education, (Assistant Professor)**

Signature \_\_\_\_\_

Date \_\_\_\_\_

### **Approval of 2<sup>nd</sup> advisor:**

Name: **Mr Mulugeta Hailu (MPH-HSM)**

Signature \_\_\_\_\_

Date \_\_\_\_\_