# Factors contributing to poor Biomedical Waste Management among Health Workers in Katabi Military Hospital in Entebbe District. A Cross-sectional Study.

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**Abstract**

**Background:**
The study aimed at finding out the knowledge, practices, and the effects of poor Biomedical Waste Management among health workers in Katabi Military hospital– Entebbe district.

**Methodology:**
A descriptive cross-sectional study design was carried out from August 2021 to March 2022. to assess the factors contributing to poor Biomedical Waste Management among health workers in Katabi Military Hospital. The study site was purposely selected because it was one of the areas having a lot of staff we were targeting. Respondents were interviewed using pre-coded questionnaires designed in English and the collected data was analyzed using SPSS version 20.0 and later presented in form of tables, pie charts, graphs, and text statements.

**Results**:
Respondents had some knowledge about any discarded biological products such as used cotton swabs and blood from wards and laboratories being regarded as medical wastes, Practices of health workers about Biomedical Waste Management were; disposing of all kinds of waste into a general bin, not segregating the biomedical waste according to different categories.

**Conclusion:**
There is a need to institute deliberate interventions by Katabi hospital to provide clean dust bins and sanitation facilities to ensure safe disposal of fecal and solid waste.

**Recommendations:**
Government and other stakeholders should ensure that the health workers receive training on how to manage biomedical wastes of any form and supplies to be used should be readily available and should be taught on how to use them.

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## 1 Study Background

Biomedical waste refers to any waste that is generated during the diagnosis, testing, treatment, or immunization of human beings or animals, in the research activities about their production or testing (Mohit, 2017).

Health care institutions and various hospitals, diagnostic centers, blood banks, dental centers, and research centers produce a variety of waste like dressing material, cotton pads, anatomical body parts, plastic disposal items, needles, drugs, chemicals, food items, intravenous tubing's, cannula and catheter (Annanthachari, 2016).

Waste management refers to managing waste by multiple techniques to achieve solid waste and resource conservation goals. The techniques may include waste reduction, re-use, recycling, composting, transformation, disposal of landfills, and others.

Effective management of biomedical waste is a vital issue not only for hospitals, but also for the environment, law enforcement agencies, media, and the general public (C, 2017). The purpose of BMWM is mainly to reduce waste generation, to ensure its efficient collection, handling, as well as safe disposal in such a way that it controls the infection and improves safety for employees working in the system. For this, a conscious, coordinated, and cooperative effort has to be made by physicians to ward boys (Chudasama, 2013).

Proper health care waste management includes five steps namely segregation of biomedical waste at the point of generation, treatment, storage, transportation, and final disposals. The segregation of biomedical waste at the source of generation is the first step, but a crucial step in health care waste management (HCWM) because of specific methods needed for the treatment and disposal of different categories of waste. The health personnel who are involved in handling the biomedical waste at different points of generation in the hospital include doctors, nurses, lab technicians, ward boys, etc. Thus the knowledge regarding BMWM among health care personnel has a greater impact on health and the environment (Anish, 2013).

Globally, 18-64% of health care institutions are reported to have unsatisfactory BMWM facilities; predictors' lack of awareness, insufficient resources, and poor disposal mechanism (WHO, 2013).

In Africa, healthcare waste (HCW) has not received the much-needed attention that it deserves. This is because of the inadequate resources in these countries resulting in low priority for HCW management. In many countries, there is limited segregation of hazardous and medical wastes and usually mixed with non-infectious waste. Inadequate knowledge and attitude among the health care worker (Tsebeni, 2019).

In Uganda, during the evaluation of injection safety and BMWM, it was found out that 92% of waste handlers have poor waste disposal methods, 3.4% have acceptable waste disposal methods and 4.6% have good waste disposal methods (Muhwezi, 2014) and Katabi hospital is one of them.

## 2 Methodology

**Study Area**

The study was conducted in Katabi Military Hospital. The health facility is a district hospital that has several wards and serves a population of approximately a 0.5million people from the Katabi municipal council, Entebbe town.

Katabi military hospital is located on the Entebbe road, in the town of Katabi town council, in the Entebbe district about 0.5kilometres west of Entebbe Region Hospital. This is approximately 40kilometres (25mi), south of Mulago National Referral Hospital. The coordinates of Katabi Military hospital are: 0005'01.0" N, 32028'50.0" E (Latitude:0.083612; Longitude:32.480557)

**Study Design**

A descriptive cross-section study was carried out to access the factors contributing to poor management of bio-medical waste among health workers in Katabi health center using both qualitative and quantitative data.

**Study Population**

The study included health workers in Katabi health center IV to assess the factors contributing to poor management of bio-medical waste among health workers in Katabi health center.

**Sample Size Determination**

The sample size was determined using the Kish and Leslie formula (1965);

N= Z2PQ

Where;

N = desired sample size

P = Estimated population of desired characteristics

Z = standard deviation taken as 1.65 at a confidence level of 95%

If there is no measured estimate, we use 50% (constant) or 0.5 therefore: P = 75%=0.75

d=Degree of accuracy desired 0.1 or 10% and in this case 95% confidence level has 10% errors, therefore 0.1 is a significance level.

q=Represents (1-p) where, q=0.25

N= (1.65)2 x 0.75 x 0.25

N=51.046875

N=51 respondents

Therefore, the researcher will consider 50 respondents from Katabi Health center IV who were available for the study.

**Sampling technique**

The convenience sampling method was used where health workers easy to contact or reach will be involved in the study.

**Sampling Procedure**

A convenience sampling method was used where health workers available and easy to reach will be involved in the study.

This method involved the sample being drawn from the part of the population that was close to hand. People who are willing and available to participate were used in the study. The method was cheap, easy to conduct and the data needed is readily available.

**Data Collection Procedure.**

The researcher got the approval of the study from the Kampala School of Health Sciences and thereafter was issued an introductory letter to the Medical Superintendent of Katabi hospital. The researcher introduced herself to the health workers at Katabi hospital. A consent form was issued to the participants for data collection. Questionnaires were used to obtain data during the study.

**Data Collection Tools**

The data were collected using semi-structured questionnaires of 21 open and closed-ended questions.

**Questionnaire**

This tool was used because large amounts of information were collected from a large number of people in a short period and was relatively cost-effective.

**Quality Control**

The forms were checked for completeness before the respondent level to ensure that the methodology was able to answer the objectives of the study.

The questionnaire was pre-tested and administered to 10 respondents among health workers in Katabi hospital and adjustments were made appropriately based on their responses.

The data collection tools were designed appropriately to ensure that they are of quality for example; questionnaires are structured with non-ambiguous and well-spaced questions to avoid congestion and provide tidy work.

**Inclusion and Exclusion Criteria**

**Inclusion Criteria**

All health workers of Katabi military hospital were present during the period of data collection.

**Exclusion Criteria**

All health workers of Katabi Military hospital were absent and did not consent to the study.

## 3 Data Analysis and Interpretation

Data was collected coded and entered into Microsoft Office Excel. Descriptive (univariate) data were presented as frequencies and percentages and illustrated using frequency tables, pie charts, and bar graphs. Qualitative data collected during the interviews was coded in themes and entered into master sheets by the researcher. Data was analyzed manually using the Pearson Chi-square independent content analysis technique and findings were integrated during report writing in form of quotes and narratives to supplement the quantitative data.

**Ethical Considerations**

The proposal was approved by the research committee of the school and an introductory letter was obtained from the school that introduced the researcher to the Medical Superintendent (MS) at Katabi hospital. Permission to collect data was obtained from the MS Katabi hospital.

Informed written consent was sought from respondents who will be assured of the confidentiality of the information provided.

To ensure anonymity, the names of the respondents were not stated on any data collection tool.

## 4 Results

Respondents to these questionnaires were health workers in Katabi hospital. Health workers were interviewed by a simple random sampling technique and the finding were then tabulated for presentation in a summarized format guided by the objectives of the study as below.1

### 4.1 Demographic data

From the table 1, most (50%) of the respondents were aged between 30-39 whereas least (4%) of the respondents were aged between 40-49.

Furthermore, based on sex, most (66%) of the respondents were males whereas least (34%) of the respondents were females.

Furthermore, based on marital status, most (40%) of the respondents were single whereas at least (14%) of the respondents were divorced/separated.

**Table 1.** Shows the distribution of respondents according to their demographic features.

| Variables | Frequency(f) | Percentage (%) |
|---|---|---|
| **Age** | | |
| 20-29 | 18 | 36 |
| 30-39 | 25 | 50 |
| 40-49 | 2 | 4 |
| 50 and above | 5 | 10 |
| Total | 50 | 100 |
| **Sex** | | |
| Female | 17 | 34 |
| Males | 33 | 66 |
| Total | 50 | 100 |
| **Marital status** | | |
| Married | 12 | 24 |
| Single | 20 | 40 |
| Widowed | 11 | 22 |
| Divorced/separated | 7 | 14 |
| Total | 50 | 100 |
| **Profession** | | |
| Nurse | 21 | 42 |
| Clinical officer/doctor | 10 | 20 |
| Midwife | 15 | 30 |
| Pharmacist/Pharmacy technician | 4 | 8 |
| Total | 50 | 100 |

In conclusion, based on profession, most (42%) of the respondents were nurses whereas least (8%) of the respondents were pharmacists/pharmacy technicians. Facility related factors contributing to poor biomedical waste management.

From the figure 1, most (64%) of the health workers agreed that there were different types of waste generated whereas the least (36%) of the health workers disagreed.

From the table 2, most (37.5%) of the respondents said that cotton wastes were generated whereas least (6.25%) said that ampoule wastes were generated.

From the figure 2, the majority (78%) of the respondents agreed that the hospital has a biomedical waste management plan whereas a minority (22%) disagreed.

From the figure 3, the majority (98%) of the respondents agreed that the hospital has color-coded bins whereas a minority (2%) disagreed.according to the color of coded bins.

From the figure 4, most (36%) of the respondents said that the bins were coded black whereas least (16%) of the respondents said that the bins were coded red.

From the table 3, most (48%) of the respondents said that incinerator pits were the method of disposal used whereas least (5%) of the respondents said that other methods of disposal were used.

From the figure 5 most (60%) of the respondents agreed that the size of the hospital contributes to poor biomedical waste management whereas least (40%) agreed otherwise.

## 4.2 Individual related factors contributing to poor biomedical waste management among health workers.

From the figure 6, majority (81%) of the respondents agreed that they have heard about information regarding biomedical waste management whereas minority (19%) of the respondents agreed otherwise.

From the figure 7 majority (72%) of the respondents agreed that they segregate biomedical wastes depending on different categories whereas minority (28%) of the respondents agreed otherwise.

From the table 4, most (40%) of the respondents said that they dispose syringes, needles, cotton and

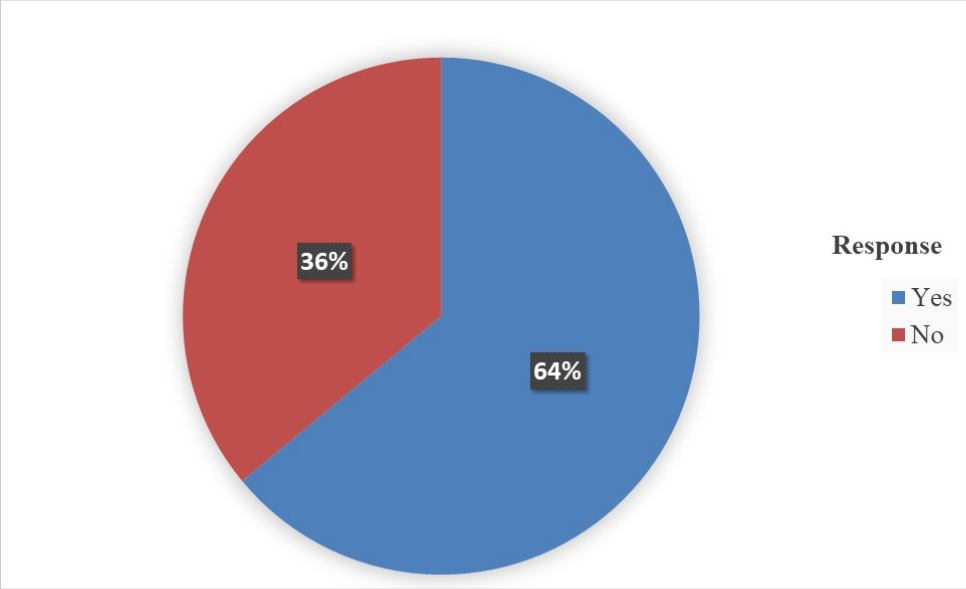


**Figure 1.** Shows the distribution of respondents according to if theirdifferent types of wastes generated.

**Table 2.** Shows the distribution of respondents according to the different types of wastes generated in the hospital.

| Waste generated | Frequency | Percentage |
|---|---|---|
| Cotton | 12 | 37.5 |
| Needle | 8 | 25 |
| Syringes | 3 | 9.3 |
| Gauze | 4 | 12.5 |
| Cannulas | 2 | 6.25 |
| Ampoules | 3 | 9.3 |
| Total | 32 | 100 |

**Table 3.** Shows the distribution of respondents according to methodof disposal used.

| Response | Frequency | Percentage |
|---|---|---|
| Incineration pits | 24 | 48 |
| Landfills | 10 | 20 |
| Pits | 11 | 22 |
| Others | 5 | 10 |
| Total | 50 | 100 |

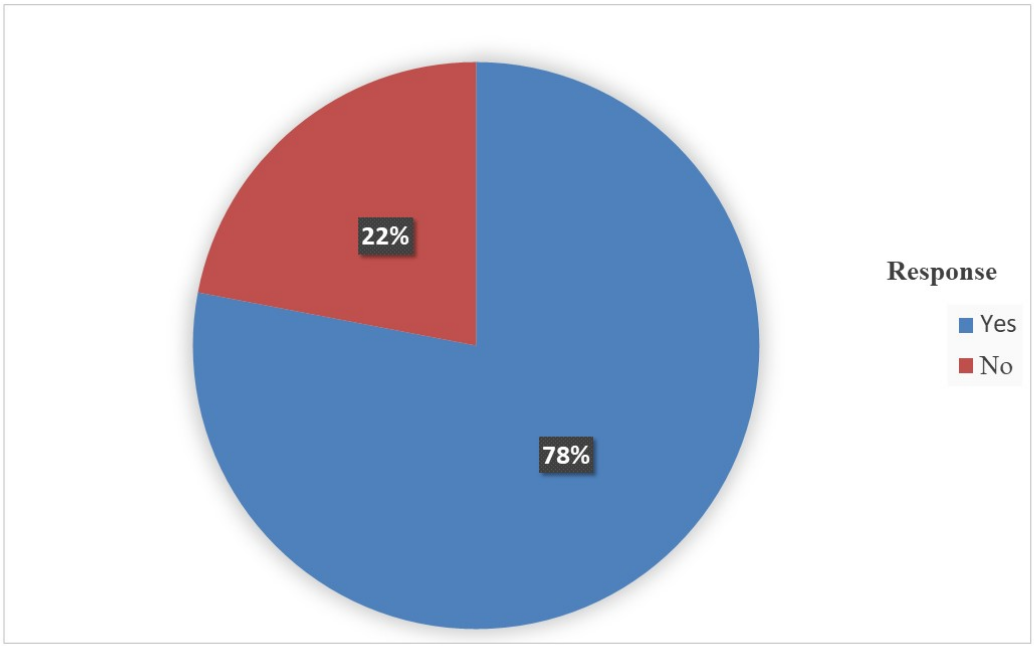


**Figure 2.** Shows the distribution of respondents according tobiomedical waste management plan.

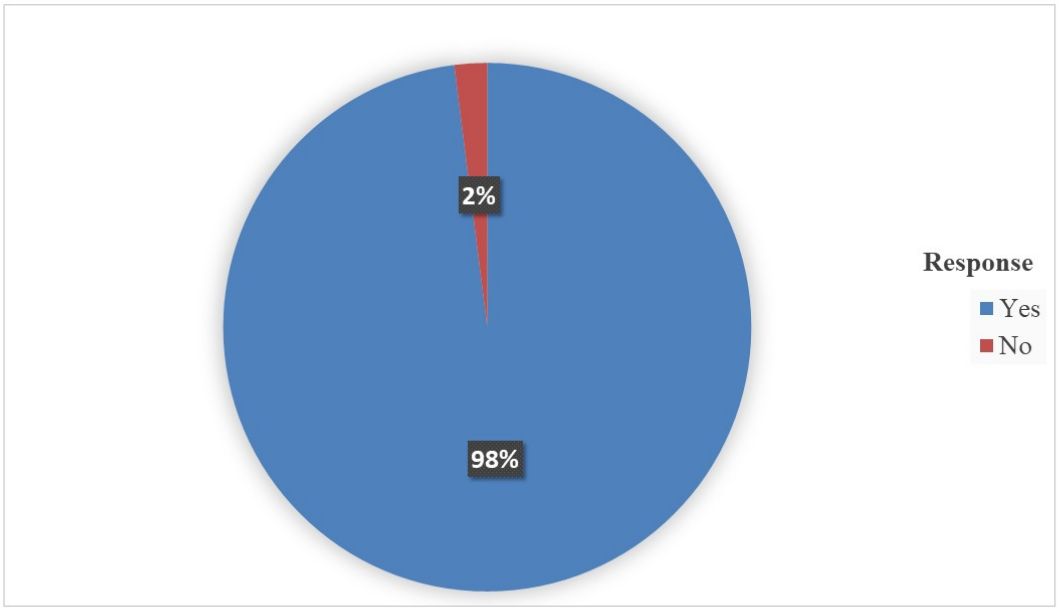


**Figure 3.** Shows the distribution of respondents according to whetherthe hospital has color-coded bins.

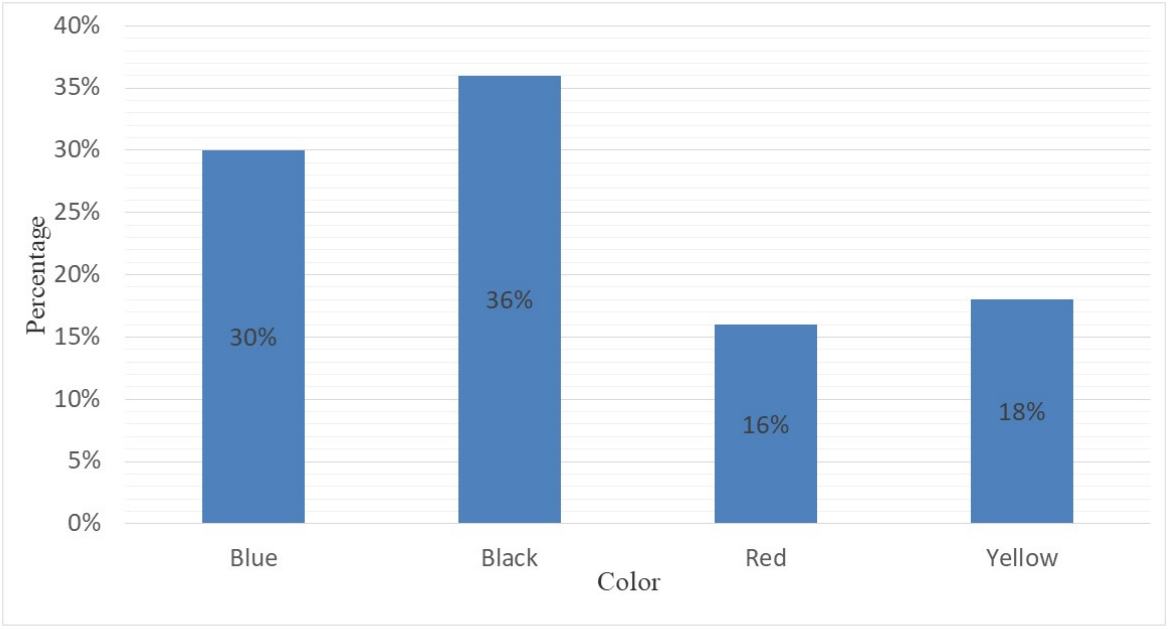


**Figure 4.** Shows the distribution of respondents accordingto the color of coded bins.

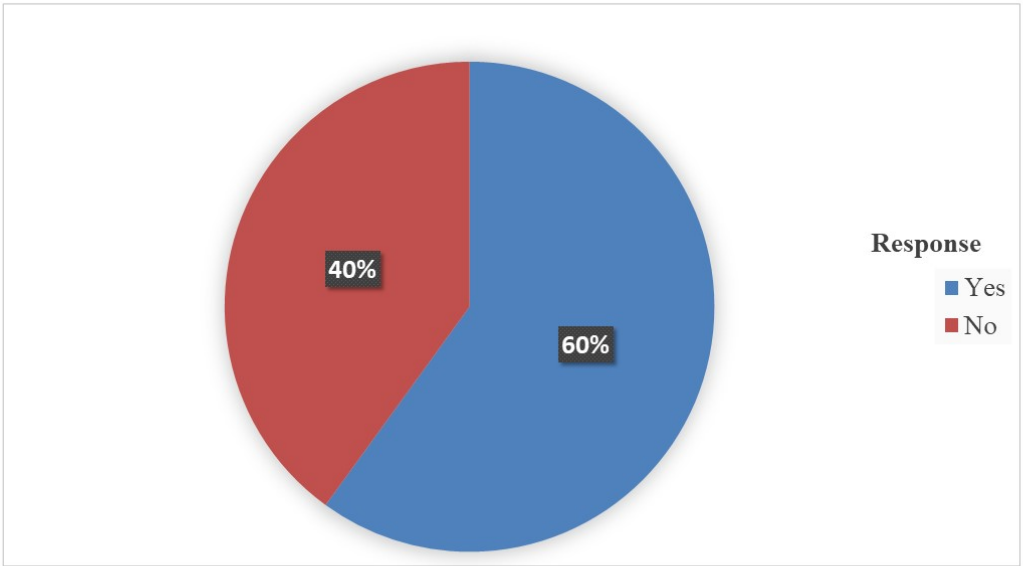


**Figure 5.** Shows the distribution of respondents accordingto if the size of the hospital contributes to poor biomedical waste management.

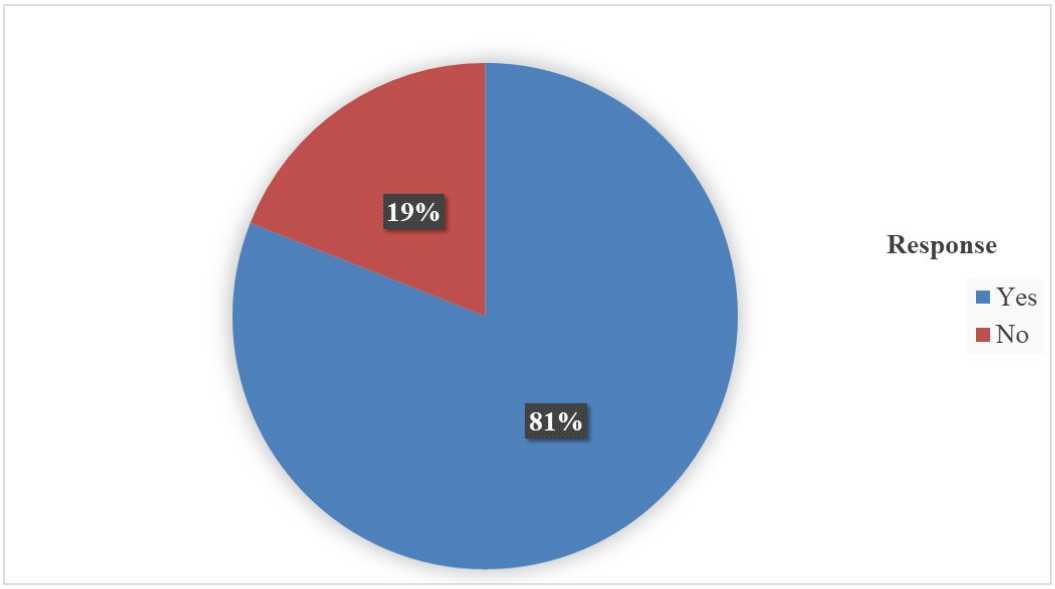


**Figure 6.** Shows the distribution of respondents according to information about biomedical waste management.

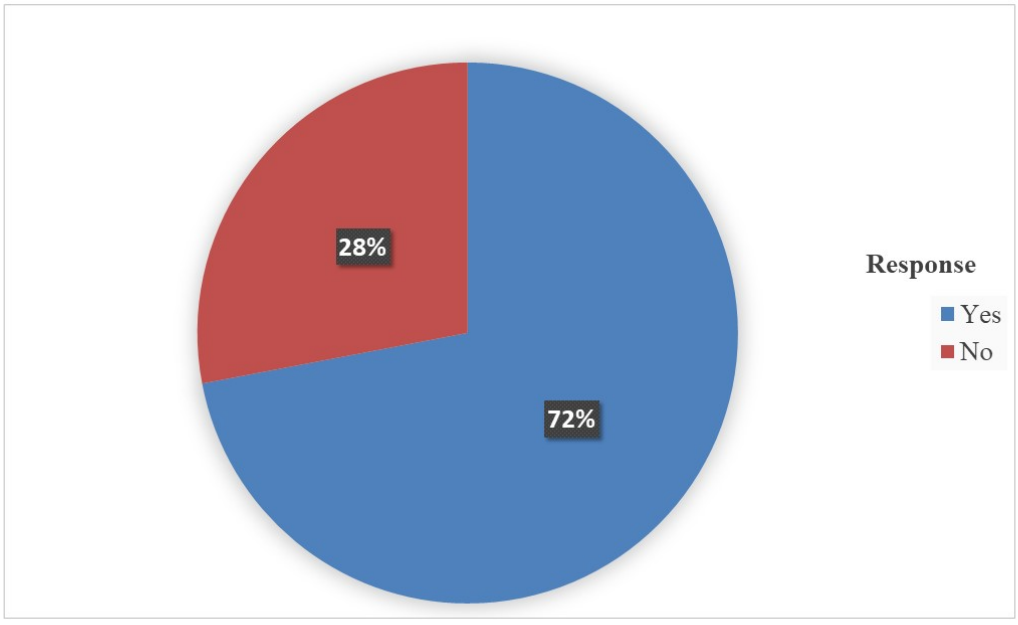


**Figure 7.** Shows the distribution of respondents according if they segregate biomedical wastes depending on different categories.

**Table 4.** Shows the distribution of respondents according to which color-coded bin they dispose syringes, needles, cotton and contaminated gauze.

| Bin color | Frequency(f) | Percentage (%) |
|---|---|---|
| Red bin | 12 | 33.3 |
| Blue bin | 9 | 25 |
| Black bin | 5 | 13.8 |
| General Bin | 10 | 27 |
| Total | 36 | 100 |

contaminated gauze in a general bin whereas least (14%) of the respondents said that they dispose syringes, needles, cotton and contaminated gauze in a red bin.

From the figure 8, majority (90%) of the respondents agreed that they use personal protective equipment's when disposing biomedical wastes whereas minority (10%) agreed otherwise.

From the table 5, most (40%) of the respondents said that they use gloves whereas least (4.4%) of the respondents said that they use aprons.

From the figure 9 above, most (65%) of the respondents said that biomedical waste management is an extra burden to work whereas least (16%) of the respondents said that sometimes biomedical waste management is an extra burden to work

### 4.3 Effects of poor biomedical waste management among health workers.

From the table 6, the majority(80%) of the respondents said that poor biomedical waste management can cause environmental pollution, unpleasant smell, and multiplication of insects, rodents, and worms whereas a minority (2%) of the respondents said that they didn't know if poor biomedical waste management can cause environmental pollution, unpleasant smell and multiplication of insects, rodents and worms.

From the figure 10, the majority (71%) of the respondents agreed that poor biomedical waste management causes accidents like needle stick injury whereas a minority (29%) of the respondents agreed otherwise.

From the figure 11, the majority (87%) of the respondents agreed that poor biomedical waste management can cause illnesses whereas a minority (13%) of the respondents disagreed.

From the figure 12, the majority (91%) of the respondents agreed that poor biomedical waste management can cause nosocomial diseases and skin disorders whereas a minority (9%) of the respondents agreed otherwise.

## 5 Discussion of results

**Health-facility related factors contributing to poor biomedical waste management among health workers.**

Most (48%) of the respondents said that the hospital has no well-designed incinerator pit sites for waste disposal hence making segregation and waste management difficult since pits were not protected from scavengers thus contributing to poor biomedical waste management among health workers and this finding is in line with the qualitative cross-section study conducted in 30 of 52 health facilities in kumbo east and kumbo west health districts revealed that in 86.7% of health facilities, waste disposal was by burning in pits located within 400m away from the facility. These incinerator pits were not protected from scavengers. Only 4 facilities had incinerator pits and all did not meet the required standards, as none was equipped with a scrubber. Even after segregation at the point of generation, wastes were mixed at the point of final disposal. Waste bins were not color-coded and all facilities had appropriate safety boxes for sharps. (Gillian Dzekashu, 2017).

The majority of the respondents (60%) agreed that the size of the hospital contributes to poor biomedical waste management due to a large number of wastes generated yet disposal methods such as incineration, pit burning, and burying are not practically done well thus compliance and adherence to proper waste management becomes a challenge and this study finding correlate with a cross-section study carried out on factors influencing

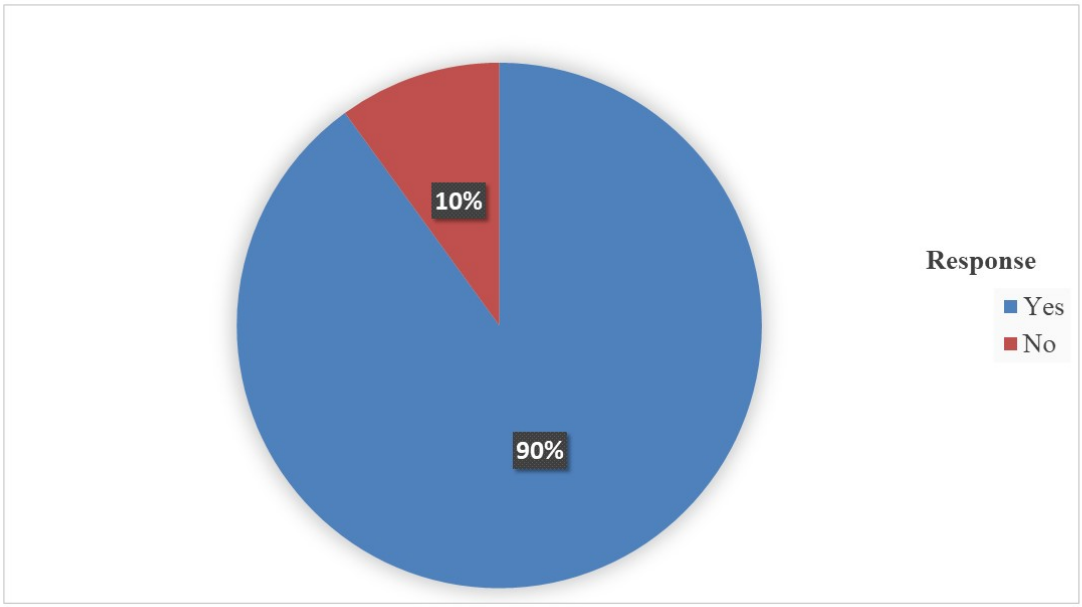


**Figure 8.** Shows use of personal protective equipment when disposing biomedical wastes.

**Table 5.** Shows the distribution of respondents according to which personal protective equipment they use in the hospital.

| Personal protective equipment | Frequency(f) | Percentage (%) |
|---|---|---|
| Gloves | 18 | 40 |
| Apron | 7 | 15.5 |
| Masks | 8 | 17.8 |
| Boots | 10 | 22.2 |
| Others | 2 | 4.4 |
| Total | 45 | 100 |

**Table 6.** Shows the distribution of respondents depending on whether poor biomedical waste management can cause environmental pollution, unpleasant smell and multiplication of insects, rodents and worms.

| Response | Frequency(f) | Percentage (%) |
|---|---|---|
| Yes | 40 | 80 |
| No | 3 | 6 |
| I don't know | 1 | 2 |
| Sometimes | 6 | 12 |
| **Total** | **50** | **100** |

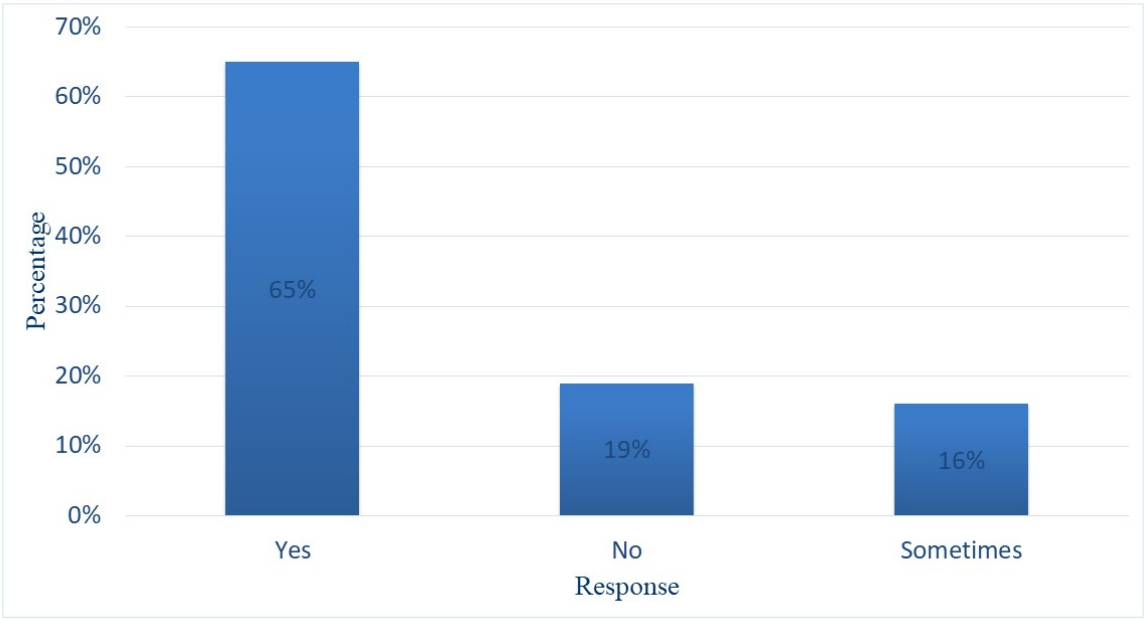


**Figure 9.** Shows the distribution of respondents according to whether biomedical waste management is an extra burden to work.

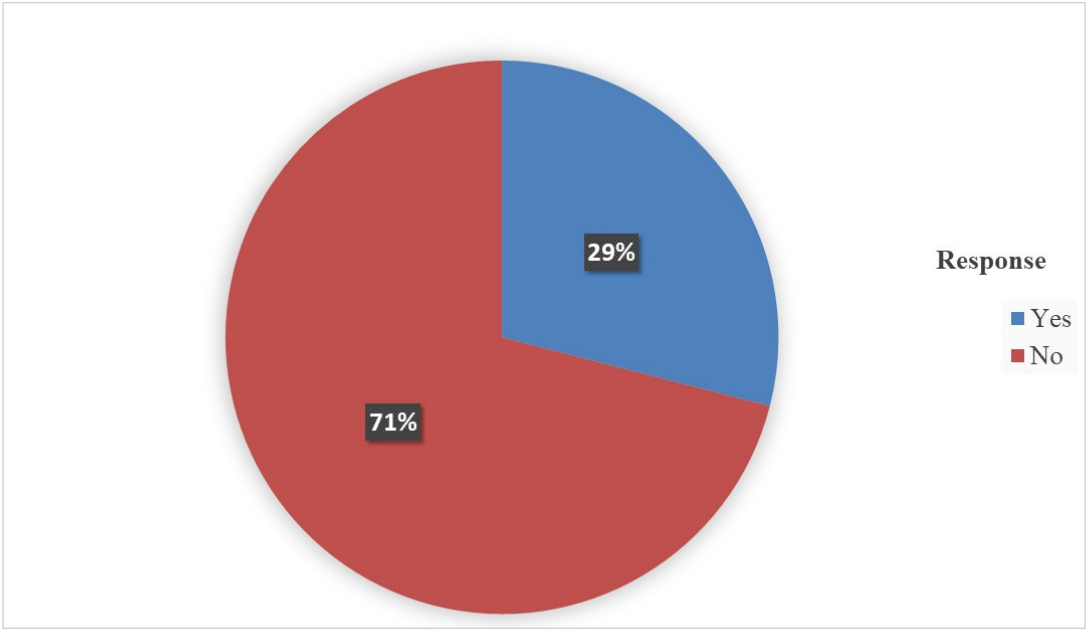


**Figure 10.** Shows the distribution of respondents according to if poor biomedical waste management causes accidents like needle stick injury.

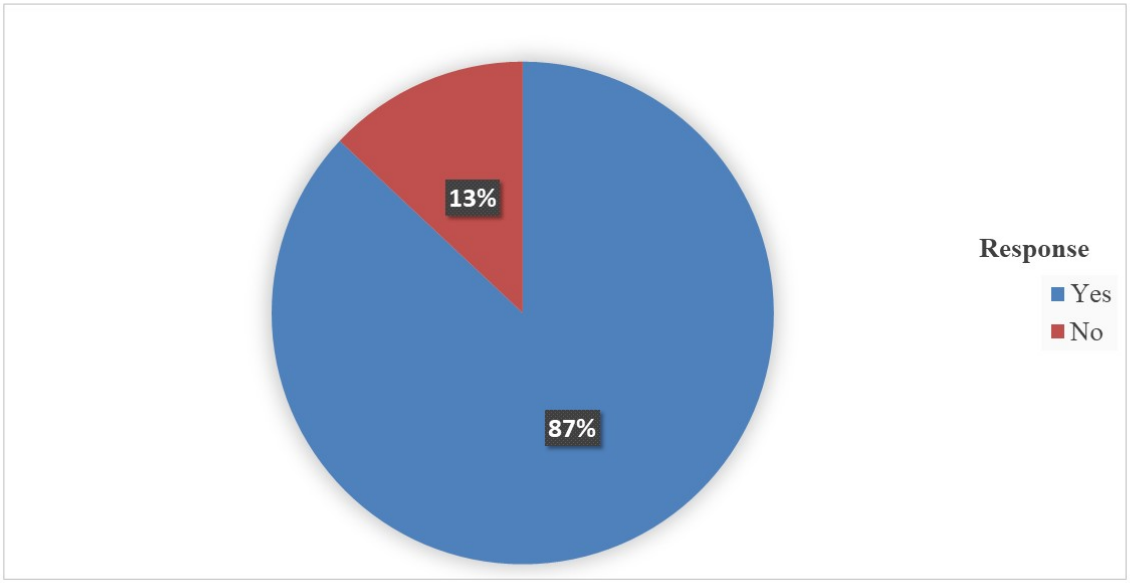


**Figure 11.** Shows the distribution of respondents according to if poorbiomedical waste management can cause illnesses.

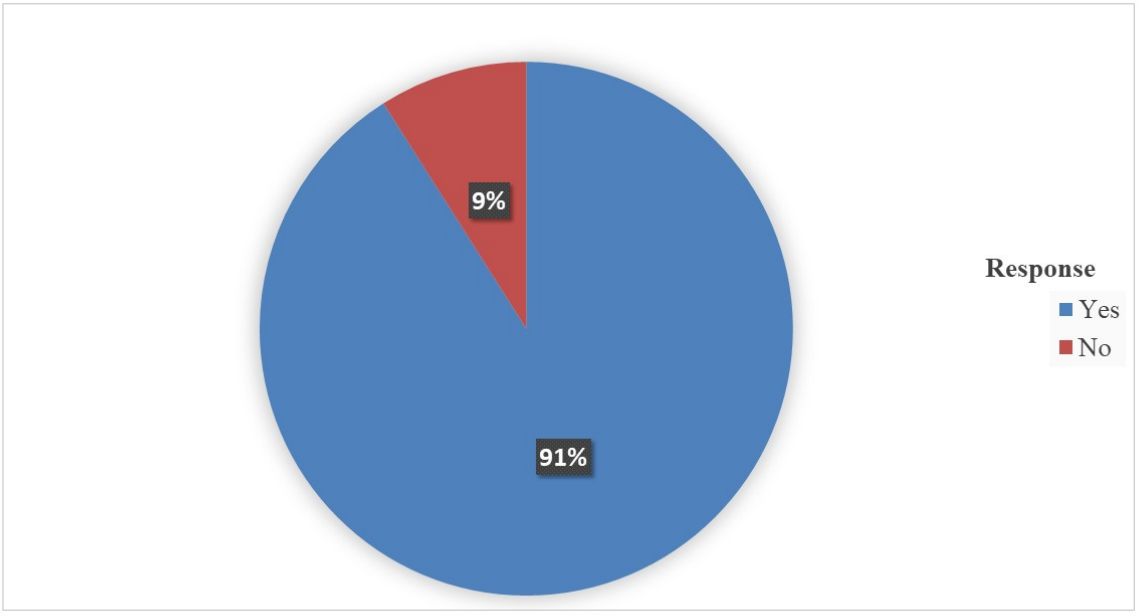


**Figure 12.** Shows the distribution of respondents according to if poor bio medical waste management can cause nosocomial diseases and skin disorders.

adherence to proper health care waste management practices among health workers in Wakiso district, Uganda showed that most health facilities have 10 to 25 health care waste handlers (85.6 %%) while a very negligible proportion (0.75%) of them have more than 45 HCW handlers. It also revealed that the type and size of the health facility affect the compliance to HCWM of solid wastes and self-contained onsite treatment methods are more desirable and feasible in large public healthcare facilities but are impractical or uneconomical for smaller health facilities; and logically the size of the health facility dictates the mode of waste management (Josephine Babirye, 2020).

**Individual related factors contributing to poor biomedical waste management among health workers.**

The majority of the respondents (81%) had never received any information about biomedical waste management such as methods of waste disposal, segregation of wastes, and waste treatment before disposal. This finding does not correlate with a quantitative study carried out in jawah-lah which showed that knowledge regarding the hazardous nature of BMW is much lower than expected standards especially among the nursing staff and class 4 workers (12.5%) and 13.33% respectively, whereas awareness among doctors was lower than expectations (53.33%). The knowledge regarding the correct duration of storage of BMWs was poor amongst both nursing staff 31.75% and class 4 (66%), however, their knowledge about BMW as a disease source was greater in nursing staff (93.75%); 80% in class 4. Disappointingly only 42.83% of doctors and 31.25% of the nursing staff had received BMW management training (Mohit, 2017).

Most of the respondents (65%) felt that biomedical waste management is an extra burden on their work since the most time they are occupied by hospital work like attending to emergencies and other patients of all kinds hence no time to practice proper biomedical waste disposal hence poor biomedical waste management and this finding is in line with the study which indicated that One –fourth participants (26.14%) showed unfavorable attitude towards biomedical waste management. Most of the participants 159(90.34%) felt poor handling of biomedical waste is an important issue and a matter of concern and it's a part of their duty but 69(39.2%) felt that it was an extra burden on work (Vanesh, 2016).

The majority (72%) of the respondents segregate biomedical wastes according to different categories, especially at the time of segregation hence protection from the injuries though sometimes they don't segregate at the time of generation due to work overload and pressure generated by the patients during treatment and this finding is in line with the study which showed that segregation has been identified as an important aspect of healthcare waste management. It refers to the process of separating healthcare waste into various selected or labeled categories. This is significant for ensuring the safe management of healthcare waste as it entails that all waste should be separated from general waste at the source of generation (Sambo, 2017).

**Effects of poor biomedical management among health workers in Katabi hospital in Entebbe district.**

The majority (91%) of the respondents agreed that poor biomedical waste management causes nosocomial diseases and skin infections. Other diseases include typhoid, cholera, HIV/AIDS, and hepatitis which increase hospital visits and loss of lives. This finding is in line with the study which showed that diseases associated with poor medical waste management include nosocomial diseases, typhoid, skin disorders, intestinal parasites, and hepatitis. In addition, there is a potential risk of HIV transmission to a susceptible human host from percutaneous injury by infected sharps (Julius, March 2015)

The majority of the respondents (80%) agreed that poor biomedical waste management causes environmental pollution, unpleasant smell, and multiplication of insects, rodents, and worms which leads to the spread of infections that can be life-threatening and this study is in line with the study which showed that Poor medical waste management causes environmental pollution, unpleasant smell, growth and multiplication of insects, rodents and worms, and may lead to transmission of diseases like typhoid, cholera, and hepatitis through injuries from sharps contaminated with blood (Garba, 2013). Also, it is in line with the study which showed that Medical waste is also a source of contamination of land and water sources if not rendered harmless before its burial on land or disposal in water. Furthermore, medical waste emits

harmful gases, which lead to atmospheric and environmental pollution, when treated in open burning or burning in incinerators. These emissions can cause respiratory and skin diseases or even cancer, if precautionary protocols are ignored (Ibrahim, 2013).

The majority of the respondents (71%) agreed that poor biomedical waste management causes accidents like needle stick injury, especially from those which are already used and they are infectious hence many people end up getting infected with hepatitis, HIV and this is in line with the study which showed that a person who experiences one needle stick injury from a needle used on an infected source patient has a risk of 30%, 1.8%, and 0.3% respectively of becoming infected with Hepatitis B virus (HBV), Hepatitis C virus (HCV) and HIV (WHO, 2018). And also in the same line with the study which showed that a total of 80% of the waste generated in the hospitals is composed of general waste while the remaining 20% comprises infectious, toxic, or radioactive waste. Of this, 20% of the waste is highly infectious and dangerous and could cause serious damage to the society and the environment when it is not properly segregated and disposed of (Joseph, 2015).

## 6 Conclusions

Social-demographic characteristics of the study participants were: the majority of the respondents were aged between 30-39 years (50%), males were more than females (66%), single (40%), Majority of respondents were nurses (42%).

Concerning individual-related factors about BMWM, (81%) had some knowledge about biomedical waste management and the majority (72%) of the respondents were segregating wastes according to their different categories as required in different color-coded bins and most were using personal protective equipment while disposing of the wastes.

Practices of health workers about BMWM were; disposing of all kinds of waste into the general bin,

Not segregating the biomedical waste according to different categories, denying that they had training on biomedical waste handling and disposal.

Effects of poor BMWM were; poor disposal of medical wastes contaminates water sources, poor disposal of pharmaceutical wastes leads to diseases like cancer, causes accidents, waste is highly infectious and dangerous and causes serious damage to the society and the environment, leads to the transmission of diseases like typhoid, cholera, and hepatitis through injuries from sharps contaminated with blood, hazardous and toxic parts of waste from healthcare establishments comprising infectious, medical and radioactive material as well as sharps constitute a grave risk to mankind and the environment.

**Recommendations**

**Recommendations to Policy makers and Government agents**

Following the conclusions above, the following recommendations should be considered:

The Government and other stakeholders should ensure that the health workers receive training on how to manage the waste of any form and supplies to be used should be readily available and should be taught how to use them.

The district health service provider should intensify effective health education in the community, paying special attention to waste disposal management education and communication materials geared towards sensitizing them to reduce the incidence of pollution and rising infections.

The DHO should work with and facilitate administrators, and village health teams to promote a good sanitary environment to reduce the incidences of injuries from dumped sharp materials and infectious materials to both the staff and community at large.

## 7 Acknowledgement

I acknowledge the Ministry of Education and Sports and Ministry of Health for incorporating the research project into the curriculum which has helped me develop writing and research skills.

I acknowledge my mother Mrs. Nalubwama Evelyn, my friend Lakop Esther Faith who has tirelessly stood with me in all times of struggle both academically and socially, and my supervisor Mr. Nimwesiga Gordon who has always been there for me as my role model where he has always guided me about my career and for all their support towards my academic struggles.

May God bless them all

## 8 List of Abbreviations and Acronyms

**BMWM**: Biomedical Waste Management

**BMWs:** Biomedical Wastes

**HCFs:** Health-Care Facilities

**HCWM:** Health-Care Waste Management

**HCWs:** Health-Care Wastes

**MS:** Medical Superintendent

**MW:** Medical Waste

**MWHs:** Medical Waste Handler

**MWM:** Medical Waste Management

**UAHEB:** Uganda Allied Health Examination's Board

**WHO:** World Health Organization

**KMH:** Katabi Military Hospital

**DHO:** District Health Officer

## 9 Definitions

**Biomedical wastes:** This refers to any solid and or liquid waste including its container and any intermediate product which is generated during the diagnosis, treatment or immunization of human beings or animals or in research pertaining there to or in the production or testing thereof.

**Biomedical waste management:** This means the activities that are involved in handling wastes which include waste collection, segregation, storage, treatment, transport to final disposal site and final disposal.

**Pharmaceutical wastes:** It includes expired or unused pharmaceutical products spilled or contaminated pharmaceutical products, surplus drugs, vaccines or sera and many others.

**Segregation of wastes:** This refers to sorting and separation of waste types to facilitate recycling k and correct onward disposal.

**Pollution:** Refers to the presence of harmful substances or poisonous substances in an a environment

**Infectious wastes:** Refers to waste contaminated with blood and other bodily fluids.

**Factors:** Refers to elements contributing to a particular result, situation.

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**Table 7. References**

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