# AN ASSESSMENT OF HOSPITAL WASTES MANAGEMENT IN AHMADU BELLO UNIVERSITY TEACHING HOSPITAL (ABUTH) SHIKA – ZARIA KADUNA STATE, NIGERIA

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**ZARIA, NIGERIA**

**MAY, 2018**

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**A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN SOCIOLOGY**

**DEPARTMENT OF SOCIOLOGY**
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**ZARIA, NIGERIA**

**MAY, 2018**

## DECLARATION

I hereby declare that the work in this dissertation entitled **"An Assessment of Hospital Wastes Management in Ahmadu Bello University Teaching Hospital (ABUTH), Shika – Zaria, Kaduna State, Nigeria"** has been carried out by me under the supervision of Dr (Mrs.) P.E.U. Mudiare and Dr (Mrs.) E.C. Akpa in the Department of Sociology, Faculty of Social Sciences, Ahmadu Bello University, Zaria. The information derived from the literature has been duly acknowledged in the text and a list of references has been provided. No part of this dissertation has been presented in this institution or any other institution for the award of a master degree.

_____ _____

**Philip Ayodele FATUASE** **Date**

## CERTIFICATION

This dissertation titled **"An Assessment of Hospital Wastes Management in Ahmadu Bello University Teaching Hospital (ABUTH), Shika – Zaria, Kaduna State, Nigeria"** by Philip Ayodele FATUASE meets the regulations governing the award of the degree of Master of Science (M.Sc.) Degree in Sociology of the Department of Sociology, Ahmadu Bello University Zaria and is approved for its contribution to knowledge and literary presentation.

| | | |
|---|---|---|
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## DEDICATION

This dissertation is dedicated to God the Father, God The Son and God The Holy Spirit. The Omniscience, Omnipotent and Omnipresent God. Who was, Who is and Who is to come.

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## LIST OF ACRONYMS

**ABUTH:** Ahmadu Bello University Teaching Hospital

**AIDS:** Acquired Immunodeficiency Syndrome

**ATSDR:** Agency for Toxic Substances and Diseases Registry

**CDCP:** Centers for Disease Control and Prevention

**FEPA:** Federal Environmental Protection Agency

**FMEnv:** Federal Ministry of Environment

**HBV:** Hepatitis B Virus

**HCB:** Hepatitis C Virus

**HIV:** Human Immunodeficiency Virus

**HCW:** Health Care Waste

**HCWM:** Health Care Waste Management

**JOHESU:** Joint Health Sector Unions

**MWM:** Medical Waste Management

**NOSDRA:** National Oil Spill Detection and Response Agency

**NEMA:** National Environmental Protection Agency

**NESREA:** National Environmental Standards and Regulations Agency

**NHP:** National Health Policy

**PPE:** Personal Protective Equipment

**UNFPA:** United Nations Fund for Population Activities

**UNICEF:** United Nations Children's Fund

**USAID:** United States Agency for International Development

**WHO:** World Health Organization

## ABSTRACT

The study is on the assessment of hospital waste management in Ahmadu Bello University Teaching Hospital (ABUTH), Shika-Zaria, Nigeria. Human activities generate wastes, some are harmful and others not so harmful to man and the environment. Of concern however, are hospital wastes which come in the form of hazardous wastes such as chemical, radioactive, pathological and anatomical wastes amongst others. Carefree handling and disposal of hospital wastes has effect both directly and indirectly on staff, patients and environment. The aim of the study is to identify the gaps in current practices of hospital waste management in ABUTH Zaria in line with international best practices. The study objectives are to determine the types of wastes generated in the hospital; to ascertain the attitude of workers towards hospital waste management; to examine the effects of hospital waste on workers; to assess the challenges faced by hospital authorities in managing hospital wastes; and lastly to find out the safety measures put in place to safeguard the health of hospital workers in ABUTH Zaria. The study employed structural functionalist theory, particularly that of Talcott Parson's four functional imperatives for all 'action' system with reference to his AGIL scheme. Both quantitative and qualitative methods were employed for the study with questionnaire as the quantitative instrument, while in-depth interview and observation were utilized as the qualitative methods. A checklist was also used to compare practices on waste management in ABUTH in line with those recommended international best practices. Three hundred and forty seven (347) copies of questionnaire were administered but 290 were retrieved and analyzed and ten (10) key informants were interviewed. The findings of the research revealed that the hospital generates two types of wastes: municipal solid wastes and special healthcare wastes which in most cases are mixed up without proper segregation into different color coded containers with specified biohazard symbol as being recommended by the international best practices. The attitudes of workers towards hospital wastes management practices in the study revealed that majority of the respondents were of the view that waste management is a collective responsibility of each and every hospital workers but despite this assertion, almost half of the hospital workers were not satisfied with the attitude of workers towards waste management. Some of the workers of which are mostly women reported that cuts and piercing of needles are the major occupational hazard they sustained as a result of improper wastes segregation while on the nature of waste related diseases, it was found that fever and allergic skin diseases are the major diseases they suffered from as a result of being exposed to improper wastes management. In general, the wastes treatment method is poor as reflected in the disposal of solid wastes in open space without incineration which gives room for scavengers most of whom are children from the neighbouring village, whose health implication cannot be overemphasized. The study found out that there is no existing laid down waste management policy, neither is there record of special training for waste handlers. However, while there is special budget for waste management which the Public Health Unit oversees, there are limited personal protective equipments for the hospital workers. In view of this, the study recommends that a policy on waste management be put in place, monitored and enforced by the government. Also, personal protective equipment be provided and workers should imbibe the culture of proper waste management that is in line with international best practices. Also, injuries should be reported to appropriate hospital authority, where prompt action should be taken to avert the threat of spread of disease or infection. Finally there is need for more enlightenment campaign on waste management.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background to the study

In every society, human activities generate wastes, some are harmful and others not so harmful to man and the environment. Household and industries produce wastes, some of which can be recycled without problem. Of concern however are the hazardous wastes which come in the form of chemical, radioactive, pathological and anatomical wastes amongst others. Health facilities are not left out as they who should be in the forefront of promoting health are also guilty of producing wastes that are inimical to the health and wellbeing of people. Sometimes the problem is not the production of the waste which is inevitable, but the improper disposal of the wastes produced by these health institutions.

Hospitals are health institutions which provide preventive, promotive and curative care services. These services may be directly through patient care or indirectly by ensuring a clean and healthy environment for their employees and the community. Hospital wastes are referred to those solid and liquid wastes from healthcare establishment, research facilities, and laboratories, blood banks, nursing homes, mortuaries, autopsy centres. They could be classified into hazardous (such as infectious, pharmaceuticals, sharps, chemical, radioactive and heavy metal) and non-hazardous (such as paper, packaging, debris). It is the duty of hospitals and health care establishments to look after the public health and in the process of health care, waste is generated which usually include sharps, human tissues or body parts and other infectious materials (Patil and Pokhrel, 2005).

Most wastes generated in healthcare institutions can be treated as regular solid municipal waste. But a varying proportion of healthcare waste requires special

attention, including sharps (e.g. needles, razors, and scalpels), pathological waste, other potentially infectious waste, pharmaceutical waste, biological waste, and hazardous chemical waste. Collectively, these wastes are known as "special healthcare waste" for the fact that they are very infectious and hazardous to human health and the environment. Other waste streams generated by Health Care Waste (HCW) could include packaging, reusable medical equipment, and secondary wastes created through disposal technologies (Johannessen, Dijkman, Barlone, Henraham, Boyer, and Chandra, 2000).

In view of the enormous risk posed by hazardous wastes, the Basel Declaration to which Nigeria is a signatory, as adopted by the United Nations in 1999. Section (b) of the Declaration states that:

> The agreement clearly stated that it remains the responsibility of healthcare establishments to treat and dispose wastes generated by them in such a manner as to ensure that there would be no adverse health or environmental effects.

The World Health Organization [WHO] (1999), set guideline to address issues on improper hospital wastes management. The standard guideline and proper management of Healthcare waste is to minimize risks both within and outside healthcare facilities. The first global and comprehensive guidance document, *Safe Management of Wastes from Health-Care Activities*, originally released by WHO in 1999, addresses aspects such as regulatory framework, planning issues, waste minimization and recycling, handling, storage and transportation, treatment and disposal options, and training. The first priority is to segregate wastes, preferably at the point of generation, into reusable and non-reusable, hazardous and non-hazardous components. Generally, there are four key steps to healthcare waste management: (i) Segregation into various components, including reusable and safe storage in appropriate containers; (ii) Transportation to

waste treatment and disposal sites; (iii) Treatment; (iv) Final disposition (Nwachukwu, Frank and Ositadinma, 2003).

The Ahmadu Bello University Teaching Hospital (ABUTH), Shika-Zaria is faced with major challenges associated with hospital wastes management, this includes: lack of awareness about the health hazards, poor attitudes towards wastes management practices (i.e. deviating from the WHO (1999) standard guidelines on segregation from the point of generation, transportation, treatment and disposal of wastes), inadequate training of workers on wastes management, insufficient financial and human resources and poor control of waste disposal to their final destination. Also, appropriate regulatory framework or policy to cover hospital wastes management in ABUTH Shika-Zaria is generally poor and not effectively enforced.

In developing countries such as Nigeria, the international policy that the generator of waste is responsible for the proper management, treatment and disposal of waste has remained on paper and is yet to be implemented (Patil and Shekdar, 2001). The importance of waste disposal as a public health problem was underlined by the establishment in 1998 of the Federal Environmental Protection Agency (FEPA), the agency empowered to regulate all gaseous, liquid and solid waste handling and disposal processes (Sridhar and Ayeni, 2002; Shaba, 2002 and Obionu, 1999). The FEPA which hitherto was charged with the protection and development of the Nigeria environment was repealed and in its place a new Act - the National Environmental Standards and Regulations Agency (NESREA) was enacted on the 31st July, 2007. The NESREA Act applies to the regulation and the protection and development of the environment in Nigeria with the exception of the oil and gas sector which is regulated by the National Oil Spill Detection and Response Agency (Establishment) Act 2006 (the NOSDRA Act) and also the NESREA is responsible for the protection and development of

environmental standards, regulations, rules, laws, policies and guidelines within Nigeria. Management of healthcare waste is not strictly about data compilation and technologies of waste treatment and disposal but as Patil and Shekdar (2001), observe, it also involves training, commitment, management, leadership and effective legislation.

From the above background, one cannot put aside the fact that in many Nigerian hospitals, hospital waste management is an emerging challenge. In this regard, the study therefore explored hospital waste management practice in ABUTH Shika-Zaria along with the best international practice of healthcare waste management with a view to bridging the gap.

## 1.2 Statement of the Research Problem

Ahmadu Bello University Teaching Hospital (ABUTH), Shika-Zaria is faced with major problems associated with hospital wastes management and at the same time not measuring up to the international best practices. In the course of healthcare delivery, two major types of wastes are generated in the hospital. These are infectious and non-infectious wastes. Infectious wastes includes infectious sharps, disposable syringes, swabs, body fluids, human excreta etc. while non-infectious wastes includes papers, packaging, debris etc. These wastes are to be segregated at the point of generation into different colour coded containers with specific biohazard symbols as specified by the international best practices according to WHO (1999). The practice of wastes segregation in ABUTH negates this specified practice as both infectious and non-infectious wastes are mixed up in a none colour coded container without biohazard symbols which left the workers in danger of being infected or sustain injury in the course of wastes disposal.

The attitude of ABUTH workers towards wastes management is not satisfactory as only sharps (needle) are segregated into safety sharp boxes while other sharps are mixed up in the waste bins. This nonchalant and filthy attitude of workers in the hospital makes the hospital environment unbearable for visitors who visit the hospital at the visiting hours as most wastes bins are filled to the brim and left uncovered which emit offensive odour thereby polluting the hospital environment.

The health workers and wastes collectors in ABUTH Shika-Zaria have suffered both wastes related diseases and occupational hazard in the course of healthcare delivery and disposal of wastes. In one of the researcher familiarization study, one of the informants who is a waste handler admitted that no day passes without a waste handlers sustaining injury from sharps mainly needle piercing as a result of improper waste segregation, as most of the time wastes are not sorted from the source, which has resulted in some of the workers being infected with one disease or the other.

This study seeks to investigate further challenges ABUTH Shika-Zaria faced on waste treatment practices and final disposal of wastes. The wastes treatment in ABUTH post a lot of risk to health workers and the general public as wastes are burnt openly and the landfill not utilize for waste burial. This gives room for open air pollution which release harmful toxics to the hospital environment and the general public. The presence of scavengers also posts threat to the public health as they resell medical wastes to the public. Also poor storage system and problem of transporting these wastes to their final destination posed a challenge to the hospital waste management in ABUTH Shika-Zaria as evidence in one of the researcher pilot study in the hospital. As reputable and as large as ABUTH is, it is only one truck that is being used in transporting wastes and this truck is far below the recommended standard as most parts are open exposing workers, patience and the public to the risk of contracting diseases.

Inadequate safety measures expose workers to the risk of being effected as most of the workers were not being provided with personal protective equipment while some are of the habits of not putting on this equipment in the course of healthcare delivery and wastes disposal. This act negates the international best practices, for workers who manage hospital wastes have to be well equipped. Also inadequate training received on the part of workers on waste management reflects on their inconsistency in the use of hand gloves and eye goggles for protection.

Thus from the above discussions on the problems being faced in ABUTH Shika-Zaria on waste management therefore motivated the researcher to undertake this study in order to identify gaps in current practices of hospital wastes management in ABUTH Zaria along with international best practices and recommend ways of bridging this gap.

.

### 1.3 Research Questions

1. What are the types of hospital waste generated in Ahmadu Bello University Teaching Hospital, Zaria?
2. What is the attitude of workers towards hospital waste management in Ahmadu Bello University Teaching Hospital, Zaria?
3. What are the effects of hospital wastes on workers in Ahmadu Bello University Teaching Hospital, Zaria?
4. What are the challenges faced by hospital management in managing hospital waste in Ahmadu Bello University Teaching Hospital, Zaria?
5. What are the safety measures put in place to improve the situations of hospital waste management on workers in Ahmadu Bello University Teaching Hospital, Zaria?

## 1.4 Aim and Objectives of the Study

### 1.4.1 Aim

The aim of this research is to identify the gaps in current practices of hospital wastes management in ABUTH Zaria along with international best practices and recommend ways of bridging this gap.

### 1.4.2 Objectives

The following are the objectives of the research:

1. To determine the types of hospital waste generated in Ahmadu Bello University Teaching Hospital, Zaria.
2. To ascertain the attitude of workers towards hospital waste management in Ahmadu Bello University Teaching Hospital, Zaria.
3. To examine the effects of hospital wastes on workers in Ahmadu Bello University Teaching Hospital, Zaria.
4. To assess the challenges faced by hospital management in managing hospital wastes in Ahmadu Bello University Teaching Hospital, Zaria.
5. To find out the safety measures put in place to improve the situations of hospital waste management on workers in Ahmadu Bello University Teaching Hospital, Zaria.

## 1.5 Significance of the Study

This study has brought to knowledge how to bridge the gap and lapses on hospital waste management in ABUTH Zaria. Findings from this study have among other things brought to knowledge the necessary awareness on the health implications of hospital wastes management to the ABUTH staff in particular and the public in general. It has further contributed to knowledge in the area of proper management of hospital waste in

accordance with the international standard of healthcare waste management. It has also created awareness on policy implications to the Government and policy makers who will find the study useful in their policy formations and implementations especially manpower as well as strategies on waste collection, storage, treatment and disposal, which will be beneficial to the environment and community.

This study has also identified the level of compliance of the Ahmadu Bello University Teaching Hospitals on the recommended practices for the sustainable management of hospital wastes and also has brought to the knowledge of ABUTH waste managers and health workers on the need to ensure proper collection, storage, transportation, treatment and final disposal of hospital waste in line with the best international practices. The WHO (1999) guidelines requires that handling, storage, transportation and disposal of medical waste must be tracked, inspected and monitored by appropriate regulatory bodies for effective management. The tracking programme allows for understanding of wastes from cradle to grave and also assists in the evaluation of any potential harm to the environment and human health. In addition, the WHO (1999), gives guidelines as to how the various categories of wastes may be sorted, marked, stored and the type of container they should be sorted. For example, radioactive wastes are to be labeled with radioactive symbol and stored in a lead container. Similarly highly infectious wastes should be stored in strong leak proof plastic container that can withstand heat and labeled appropriately as “Highly infectious” with biohazard symbols.

Given the risk of spread of deadly diseases, this study has successfully created an awareness on enlightenment campaigns on the dangers of improper waste management and in so doing ameliorate the risk of contracting diseases. Furthermore, being an apex institution at the tertiary level of the healthcare delivery system, findings from this

study can also be useful to students as well as academics who might be interested in research in the area.

## 1.6 Scope of the Study

The scope of this study is on the impact of hospital waste management on workers in Ahmadu Bello University Teaching Hospital Shika-Zaria, Kaduna State, Nigeria. The study covers such areas as effects of hospital waste management on workers, attitudes of workers towards wastes management, types of wastes generated, challenges being faced by the management and measures that can be taken to improve the situations of waste management. ABUTH Zaria was selected for the study because it is the largest healthcare institution in Kaduna State and probably in Nigeria. This may deter generalization even as the practices may differ from one hospital to another.

## 1.7 Operational Definition of Terms

**Health:** The state of optimum capacity of an individual for the effective performance of the roles and tasks for which he has been socialized.

**Hospital waste:** For the purpose of this study, hospital waste will refer to all forms of waste generated in the course of diagnosis, treatment and care of patients which are discarded for final disposal.

**Hospital:** Hospitals are health institutions providing preventive, promotive and or curative care services.

**Segregation:** Segregation means "separation of different types of wastes by sorting or the systematic separation of medical waste into designated categories"

**Waste Disposal:** This means the discharge, depositing, dumping, spilling, leaking, and placing of waste on or at any premises or place set aside by the Council for such purposes

**Waste Management:** Waste management is the process of collecting, storing, treatment and disposal of solid wastes in such a way that they are

harmless to humans, plants, animals, the ecology and the environment generally (Blenkharn, 2006).

**Waste Manager:** One who is incharge of all waste produced in an establishment.

**Waste Worker:** A waste worker is one who collects waste from their source to their final destination.

**Waste:** An unwanted material, substance or object resulting from industrial, institutional, hospital and household activities which could be in the form of rubber, plastic, metal, paste, oil, organic matter and other similar commodities which are discarded for final disposal.

# CHAPTER TWO

# LITERATURE REVIEW AND THEORETICAL FRAMEWORK

## 2.1 Introduction

This section reviewed relevant literature on hospital wastes management in line with the stated objectives. They include: The types of hospital waste generated in the hospital; The attitude of workers towards hospital waste management; The effects of hospital waste on workers; The challenges faced by hospital management in managing hospital waste and The safety measures put in place to improve the situations of hospital waste management in ABUTH, Zaria. The study also employed the functionalist theory as its theoretical framework.

## 2.2 Conceptual Review of Healthcare Waste

Health care waste (HCW) is defined as the total waste stream from a health care facility that includes both potential infectious waste and non-infectious waste materials. Infectious wastes include infectious sharps and infectious non-sharp materials. Infectious sharps consist of syringe or other needles, blades, infusion sets, broken glass or other items that can cause direct injury while infectious non-sharps include materials that have been in contact with human blood, or its derivatives, bandages, swabs or items soaked with blood, isolation wastes from highly infectious patients (including food residues), used and obsolete vaccine vials, bedding and other contaminated materials infected with human pathogens. Human excreta from patients are also included in this category (WHO, 2005). Non-infectious wastes may include materials that have not been in contact with patients such as paper and plastic packaging, metal, glass or other wastes which are similar to household wastes (WHO, 2005).

Hospital waste is defined as any solid and liquid waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in related research, biological production or laboratory testing (Ferraz and Afonso, 2003).

According to Colorado Department of Public Health (2006), healthcare waste is all medical, liquid or gaseous wastes which are generated from healthcare facilities, medical laboratories, research centers, pharmaceutical and veterinary factories, veterinary clinics, nursing home institutions; human and animal remnants, body fluids; blood and derivatives, human excreta, contaminated clothing, wipes, injectors, contaminated sharp tools, expired medicines and chemicals.

Adesida and Igbuku, (1988) emphasized the aspect of exposure when they defined healthcare waste as material containing pathogens in sufficient concentrations or quantities that, if exposed, can cause diseases. These include wastes from surgery and autopsies on patients with infectious diseases. Various terms are used to describe infectious wastes. They include bio-hazardous waste; biological waste; medical waste; hospital waste; medical hazardous waste; infective waste; microbiological waste; pathological waste and red bag waste.

Chul Jang and Lee (2006) defined medical waste as any solid waste that is generated by medical treatment facilities and laboratory facilities operating in a hospital setting and is considered to be potentially hazardous to health. The waste include animal carcasses, human body and animals parts, excretion and secretion from humans and animals; discarded plastic materials contaminated with blood, culture and stocks of infectious agents; discarded medical equipments and other wastes mixed with infectious agents.

The Medical Waste Tracking Act of 1988 of United State Federal Law define medical waste as any solid waste that is generated in the diagnosis, treatment, or immunization

of human beings or animals, in research pertaining there to, or in the production or testing of biologicals. It may include wastes like sharps, disposables, anatomical wastes, culture, discarded medicines, chemical waste etc. These are in forms of disposable syringes, swabs, bandage, body fluids, human excreta etc. These wastes are highly infectious and can be a serious threat to human health, if not managed in a scientific and discriminate manner (Mokuolu, 2009).

The World Health Organization expert committee on solid waste defined Healthcare waste as the total waste from a healthcare establishment, research facilities, laboratories, and emergency relief donations. It also includes several different waste streams, some of which require more stringent care and disposal (Communal Waste, Pharmaceutical, Infectious and Anatomical, Pharmaceutical, Genotoxic chemical, Heavy metals, pressurized containers, and radioactive materials) (WHO, 2009).

According to Basel (1999) hospital wastes are wastes arising from diagnosis, monitoring and preventive, curative or palliative in field of veterinary and human medicine. In broad terms, medical waste is defined as any solid or liquid waste that is generated in the diagnosis, treatment or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological. In the same vein, the Ambulance Service Association of United Kingdom (1996), defined it as any waste which consists wholly or partly of human or animal tissue, blood or other body fluids, excretions, drugs or other pharmaceutical products, solid wastes or dressings, or syringes, needles or other sharp instruments, being waste which, unless rendered safe, may prove to be hazardous to any person coming into contact with it, and any other.

The Biomedical waste (Management and Handling) Rules of 1988 of the Government of India defined hospital waste as any waste generated during the diagnosis, treatment or immunization of human beings or animals or in research activities used in the production or testing of biological pollution control boards of every state have been given the task of authorizing and implementing the rules.

For the purpose of this study, hospital waste refers to all forms of waste generated in the course of diagnosis, treatment and care of patients which are discarded for final disposal.

## 2.3 Types of Healthcare Waste

Johannessen *et. al.* (2000) categorized healthcare wastes into two broad categories: municipal solid waste and special healthcare waste. Municipal solid wastes are non risk healthcare waste which includes all wastes comparable to domestic wastes, such as packaging materials, non-infectious bedding, building, rubble/demolition waste, hotel function waste (household, kitchen, administration), and other such wastes generated from patient wards and other patient care not related to medical care.

Special healthcare waste always needs special attention and includes:

***Sharps*:** All sharp objects that could cause a cut or puncture (whether infectious or not) including hypodermic needles, suture needles, injector tips, scalpels, lancets, knives, blades, razors, pipettes, and broken glass.

***Pathological waste***: Body tissues, organs, body parts, human fetuses, animal carcasses, liquid waste blood, plasma, coagulated factors, and body fluids.

***Redundant potential infectious waste*:** Disposable items contaminated with excreta, dressings, gowns, gloves, etc.; containers with blood products, intravenous vein, tubing,

emptied peripheral dialysis fluid bags, intravascular access devices introducers, culture dishes, microbiological slides and cover slips, test tubes, vials, vacutainers, etc.

***Hazardous chemical waste*:** Any substance, liquid or solid, with at least one of the following properties: explosive, flammable, toxic, corrosive, locally chafing, reactive or genotoxic (carcinogenic, mutagenic, teratogenic) including cytotoxic drugs. Also, all containers contaminated by these substances.

***Pharmaceutical waste*:** All pharmaceutical products, drugs, drug residuals and therapeutic chemicals that have been returned from wards; have been spilled; are outdated, contaminated, or are to be discharged because they are no longer required. Particular attention should be given to these wastes in the segregation process, as they may otherwise be resold by waste pickers.

***Radioactive waste**:* Solids, liquids and gaseous waste contaminated with radionuclides. This type of waste is generated from in vitro analysis of body tissues and fluids, in vivo body organ imaging and tumor localization, and investigative and therapeutic procedures.

***Genotoxic waste**:* highly hazardous, mutagenic, teratogenic or carcinogenic, such as cytotoxic drugs used in cancer treatment and their metabolites; Genotoxic waste derives from drugs generally used in oncology or radiotherapy units that have a high hazardous mutagenic or cytotoxic effect. Faeces, vomit or urine from patients treated with cytotoxic drugs or chemicals should be considered as genotoxic. In specialized cancer hospitals, their proper treatment or disposal raises serious safety problems.

***Infectious waste:*** waste contaminated with blood and its by-products, cultures and stocks of infectious agents, waste from patients in isolation wards, discarded diagnostic samples containing blood and body fluids, infected animals from laboratories, and contaminated materials (swabs, bandages) and equipment (such as disposable medical

devices); are considered as infectious waste, all wastes that are susceptible to contain pathogens (or their toxins) in sufficient concentration to cause diseases to a potential host. Examples of infectious waste include discarded materials or equipment, used for the diagnosis, treatment and prevention of disease that has been in contact with body fluids (dressings, swabs, nappies, blood bags…). This category also includes liquid waste such as faeces, urine, blood or other body secretions (such as sputum or lung secretions).

***Pressurized containers:*** Containers holding gases used for anaethesia, oxygen delivery, or cleaning mechanisms. This includes gas cylinders, cartridges, and disposable aerosol cans. The most common types of gas are: ethylene oxide, oxygen, and compressed air (WHO, 2005).

Based on WHO guidelines and the Basel Convention Annexes I, II, VIII and IX classification, healthcare waste can be broken down into the major categories presented in Table 2.1

**Table 2.1: Major categories of healthcare waste**

| Type of wastes | Description |
|---|---|
| Infectious waste | Infectious wastes are susceptible to contain pathogens (or their toxins) in sufficient concentration to cause diseases to a potential host. Examples include discarded materials or equipment, used for the diagnosis, treatment and prevention of disease that has been in contact with body fluids (dressings, swabs, nappies, blood bags etc). It also includes liquid waste such as faeces, urine, blood or other body secretions. |
| Pathological and anatomical waste | Pathological waste consists of organs, tissues, body parts or fluids such as blood. Anatomical waste consists in recognizable human body parts, whether they may be infected or not. |
| Hazardous pharmaceutical waste | Pharmaceutical waste includes expired, unused and contaminated pharmaceutical products, drugs and vaccines. This category also includes discarded items used in the handling of pharmaceuticals like bottles, vials and connecting tubing. |
| Hazardous chemical waste | Chemical waste consists of discarded chemicals (solid, liquid or gaseous) that are generated during disinfecting procedures. They may be hazardous (toxic, corrosive, flammable or reactive) and must be used and disposed of according to the specification formulated on each container. |
| Waste with a high content of heavy metals | Waste with high contents of heavy metals and derivatives are highly toxic (e.g. cadmium or mercury from thermometers or manometers). |
| Pressurised containers | Pressurised containers consist of full or emptied containers or aerosol cans with pressurized liquids, gas or powdered materials |
| Sharps | Sharps are items that can cause cuts or puncture wounds (e.g. needle stick injuries). They are highly dangerous and potentially infectious waste. They must be segregated, packed and handled specifically within the healthcare facilities to ensure the safety of the medical and ancillary staff. |
| Highly infectious waste | This includes microbial cultures and stocks of highly infectious agents from medical laboratories. They also include body fluids of patients with highly infectious diseases. |
| Genotoxic/ cytotoxic waste | Genotoxic waste includes all the drugs and equipment used for mixing and administration of cytotoxic drugs. Cytotoxic drugs or genotoxic drugs are drugs that have the ability to reduce the growth of certain living cells and are used in chemotherapy for cancer. |
| Radioactive waste | Radioactive waste includes liquids, gas and solids contaminated with radio nuclides whose ionizing radiations have genotoxic effects. These include x- and g-rays as well as a- and b- particles. |

Source: Safe Management of Health Care Waste WHO 1999

### 2.3.1 World Health Organization 1999 Recommended Best Practices

The WHO (1999) presents the best international safety measures on the type of protective clothing to be used depending on the risk associated with the health-care waste. The following however, should be made available to all personnel who collect or handle health-care waste:

- Helmets, with or without visors – depending on the operation.
- Face masks – depending on operation.
- Eye protectors (safety goggles) – depending on operation.
- Overalls (coveralls) obligatory.
- Industrial aprons – obligatory.
- Leg protectors and/or industrial boots – obligatory.
- Disposable gloves (medical staff) or heavy-duty gloves (waste workers) obligatory (WHO, 1999).

The WHO requires waste workers to use industrial boots and heavy-duty gloves are particularly important for waste workers. The thick soles of the boots offer protection in the storage area, as a precaution from spilled sharps, and where floors are slippery. If segregation is inadequate, needles or other sharp items may have been placed in plastic bags; such items may also pierce thin-walled or weak plastic containers. Similarly, operators of manually loaded incinerators are required to wear protective face visors and helmets especially during ash and slag removal and other operations that create dust.

The national guideline requires that handling, storage, transportation and disposal of medical waste must be tracked, inspected and monitored by appropriate regulatory bodies for effective management. The tracking programme allows for understanding of

wastes from cradle to grave and also assists in the evaluation of any potential harm to the environment and human health (FEPA, 1991, Slack, Gronow and Voulvoulis, 2004). It is also a corporate obligation for waste generators to conduct monitoring, testing or risk assessment and as well put in place policies for safe disposal of medical waste. In addition, the WHO (1999), gives guidelines as to how the various categories of wastes may be sorted, marked, stored and the type of container they should be sorted. For example, radioactive wastes are to be labeled with radioactive symbol and stored in a lead container. Similarly highly infectious wastes should be stored in strong leak proof plastic container that can withstand heat and labeled appropriately as "Highly infectious" with biohazard symbols.

**Table 2.2: WHO-recommended segregation scheme**

| Type of waste | Colour of container and markings | Type of container |
|---|---|---|
| Highly infectious waste | Yellow, marked "HIGHLY INFECTIOUS", with biohazard symbol | Strong, leak-proof plastic bag, or container capable of being autoclaved |
| Other infectious waste, pathological and anatomical waste | Yellow with biohazard symbol | Leak-proof plastic bag or container |
| Sharps | Yellow, marked "SHARPS", with biohazard symbol | Puncture-proof container |
| Chemical and pharmaceutical waste | Brown, labelled with appropriate hazard symbol | Plastic bag or rigid container |
| Radioactive waste | Labelled with radiation symbol | Lead box |
| General health-care waste | Black | Plastic bag |

Source: WHO, 2005.

## 2.4 Attitudes of Workers on Hospital Wastes Management

Healthcare waste management has recently emerged as an issue of major concern not only to hospitals, primary health-care centres and nursing home authorities but also to the environment (Mandal and Dutta, 2009). Advances in medical facilities and the introduction of more sophisticated instruments have increased the waste generation per patient in health-care units worldwide (Radha, 2009). According to the World Health

Organization (WHO, 2009), high-income countries generate on average up to 0.5 kg of hazardous waste per hospital bed per day. Although the figure for low-income countries is only 0.2 kg per hospital bed per day, healthcare waste is often not separated into hazardous or non-hazardous wastes, making the real quantity of hazardous waste potentially much higher (Waste from Health-Care Activities, 2013). This view is corroborated by Hossain (2013) when he made the observation that, clinical solid waste is a particular challenge in most health-care facilities of the developing world and poor handling practices and inappropriate disposal of hospital waste is an increasing health hazard in these countries.

The danger of handling wastes inappropriately especially in developing countries was emphasized by Da Silver, *et al.,* (2005). For example, they noted that hazardous and medical wastes may be handled and disposed of together with domestic wastes, thus creating a health risk to municipal workers, the general public and the environment. This practice is not far fetch from the researchers study area where general wastes are mixed up with medical waste. In countries where efforts have been made to tackle the problem, waste frequent methods of final waste disposal are done by incineration or autoclaving.

In the developed world, the attitude of workers on hospital waste management among workers is generally positive; however there are some results of some studies which report a negative attitude among the healthcare workers. A study done in Portugal reported a positive attitude among the health workers; 76% among the nurses and 64.8% among the doctors. This was corroborated by a study done in Canada which reported that the attitude of hospital workers towards healthcare waste management was positive (Azuike, Adinma, Nwabueze, Mbanuzuru, Epundu, Enwonwu, Chikezie, Ajator, Onebunne, Obi, 2015).

Tukaram and Asha (2014) review findings from various studies and found consistency in South Africa and India on attitudes of workers toward healthcare waste management, in one of the studies in New Delhi in particular demonstrated a positive attitude of hospital waste management rules among the doctors (81%) but a negative attitude towards healthcare waste management among the laboratory staff (12%) and sanitary staff (14%). On the other hand, the results of Singh et al. (2014), in India suggested that 100% of the doctors and only 60% of the nurses held desirable attitude regarding hospital waste management. This is collaborated by Manyele (2003), who assessed the attitudes of workers on hospital waste management in Tanzania and found negative attitudes on issues related to hospital waste management which was generally lacking among generators and handlers of hospital waste. This poor scenario on negative attitude of hospital waste management is the same in South Africa, Mozambique, Swaziland and Kenya.

In Nigeria, study done in Edo State reported that only 46% of the healthcare workers (doctors and nurses) understood the importance of healthcare waste management in the provision of safety to the public. A positive attitude among the health care workers towards rules and regulations of hospital waste and a clear understanding of their roles and responsibilities in handling healthcare waste can go a long way towards the safe disposal of hazardous hospital waste and protect the community from various adverse effects of the hazardous waste (Olubokola, 2009).

## 2.5 Effects of Hospital Wastes Management on Workers

Hospital waste can be highly infectious, particularly when contaminated blood or other body fluids results from health care activities. An injury from used sharps (needles, blood collection and infusion sets, and lancets) can transmit serious infectious diseases

– hepatitis B, hepatitis C, HIV, others medical personnel but health care support staff – cleaners, waste handlers, laundry workers, and others are more at risk. Moreover, if disposed of improperly, scavengers may collect and recycle the used sharps, thus spreading infectious diseases to the community. Children who scavenge are more prone to needle-stick injuries from syringes and needles. Another risk is from expired medicines that are often collected and resold if they are not disposed of, creating another public health risk. More so, unauthorized and improper burning and/or dumping of health care wastes pollutes the air with dangerous gases, thus contaminating the soil and water with heavy metals and other toxic chemicals, that can enter the food chain, causing respiratory tract diseases and cancer (United States Agency for International Development [USAID], 2011).

A study of Health Care Waste management in Jos Metropolis, Nigeria revealed that health-care workers are exposed to many microbiological agents that are present in patients. In some outbreak situations, health care workers have also been severely affected (Ngwuluka *et al.*, 2012). In another study in Port-Harcourt metropolis, Nigeria carried out to assess hospitals waste management practice (Ogbonna 2011) reported high rate of needle piercing injuries, cuts and other percutaneous exposures to blood among hospital workers in Port-Harcourt metropolis are major occupational hazards.

WHO (2004), reported that 191 American workers had been reported to the Centers for Disease Control and Prevention's (CDCP's) national surveillance system for occupationally acquired HIV infection. Of this number, 136 workers reported occupational exposures to blood, body fluids, or laboratory specimens containing HIV, and were considered possible cases of occupationally acquired HIV infection. The risk of viral hepatitis B and C infection from contact with health-care waste may be more significant, because these viruses are viable outside a host for longer than HIV. The

Agency for Toxic Substances and Diseases Registry reported an estimated of annual numbers of HBV infections resulting from injuries from sharps among medical personnel and waste-management workers. The annual number of HBV infections in the United States of America resulting from exposure to health-care waste was between 162 and 321, out of an overall yearly total of 300 000 cases from all causes. There were insufficient data on other infections linked to health-care waste to allow any conclusions to be reached. However, on the basis of the figures for HBV, all personnel handling health-care waste should be immunized against the disease. A similar approach is not possible for HBC, because no vaccine is available (Beltrami *et al.*, 2000).

Poor management of hospital waste is known to contribute to spread of several disease infections (Sobotova *et al.*, 2004). WHO has estimated that, each year, there are 8-16 million cases of hepatitis B Virus infection. Also, 2.3- 4.7 million cases of hepatitis C Virus infection and 80,000-160,000 cases of HIV due to unsafe injections and mostly due to unusually poor hospital waste management systems (WHO 2005). Unregulated clinical waste treatment and disposal has been linked to various public health threats (Solberg 2009). Harmful chemicals present in these wastes such as heavy metals can also cause water pollution. Landfill technology can also cause water pollution in the form of leaches. The illegal dumping of medical wastes in deprived residential areas has resulted in situations where children have been found playing with medical waste materials such as used syringes (Reuters News Agency 2008). More so, burning and incineration of medical and municipal waste have resulted in the release of toxic dioxin as well as mercury and other toxic substances (WHO 2005).

Talaat (2003) reported high frequency of needle stick injuries and other percutaneous exposures to blood among health care workers in the Eastern Mediterranean Region.

According to research conducted by WHO (2005), NAMRU-3 and the Ministry of Health of Egypt, one half of all health workers surveyed in Egypt were found to suffer needle stick injury every year with a mean of 4 such injuries per year. Another study in Egypt showed the mean rate of needle stick injury to be 4.9 per worker per year. Similar observations have been made in Pakistan and Yemen (Talaat 2006). WHO (1999) estimates that occupational exposures cause approximately 10,000 HBV infections and 3500 HCV infections per year among health care workers in the Region (Hauri, *et al.*, 2004).

Blackman (2006) reported that in June 2000, six children were diagnosed to have a mild form of small pox (viccinia virus) after playing with glass ampoules containing expired small pox vaccine at a garbage dump in Vladivostok. Serious accidents result from radioactive wastes have been documented in Goiania, Brazil in 1988 in which four people died from acute radiation syndrome and twenty-eight suffered serious radiation burns. Similar accidents happened in Mexico City in 1962, Algeria in 1978, Morocco in 1983 and Ciudad Juarez in Mexico in 1983 (Habibur *et al.,* 1999). In 1987, twelve children in Indianapolis, Indiana played with vials of blood that they found in a trash bin outside a hospital, two of which were infected with AIDS. The Environmental Protection Agency reports that approximately 3.2million tons of medical wastes from hospitals were generated each year, which was about 2% of the total municipal solid waste stream. Jadhav, (1992), reported that most generators of medical waste designate between 10 to 15 percent of it as infectious. Some discarded equipment such as thermometers introduce heavy metals like mercury to water sources that serve human population. Mercury poisoning leads to permanent impairment of the nervous system or death. It also causes sensory loss in limbs, impaired vision and hearing, personality changes and loss of intellectual capacity. The annual rates of injuries from sharps in

hospital waste for health-care and sanitary service personnel, within and outside hospitals, were estimated by the United States Agency for Toxic Substances and Diseases Registry (ATSDR) in its report to Congress on medical waste (ATSDR, 1990). Many injuries are caused by recapping of hypodermic needles before disposal into sharps containers, by unnecessary opening of these containers, and by using materials that are not puncture-proof to construct these containers.

Pruss, (1999) reported that exposure to hazardous wastes can be as a result of an accident, ignorance, nonchalance, deliberate negligence on the part of waste handlers, from water, food, household products, breast milk, and to fetus in the womb. The different categories of hazardous waste have their negative health impacts which may differ or have similar outcomes. The harmful effects of some wastes may not be obvious while being used and/or before they are discarded. For instance, people could get exposed during a product manufacturing process, transportation, distribution, and/or usage. Most chemical and cytotoxic drugs are good examples of products that are harmful throughout their life cycle and disposal.

According to Patil and Shekdar (2001), the effects of improper healthcare waste management can be summarized into three (3) categories: health effect, economic implication, and environmental hazards.

***Health effect:***

The health effect of healthcare wastes are in various forms ranging from non-biodegradable antibiotics, antineoplastics and disinfectants disposed of in the sewage system may kill bacterial necessary for the treatment of sewage. Antineoplastic flushed into water causes much damage to aquatic life or contaminated drinking water. Also the burning of waste at low temperatures or in open container results in release of toxic pollutants (e.g. dioxin) into the air. The carcinogenic waste such as heavy metals,

chemicals solvents and preservation pose serious human health risks not only to workers but to the general public as well. This poses danger to domestic animals being allowed to graze in open dumps, thereby adding the risk of reinforcing pathogenic microorganisms into the food chain and the public nuisance (e.g. odors, scenic view, blocking the walk way, aesthetics etc.). Besides, improper sterilization of instruments used in labor room may cause infection to mother and child (Wahab, 1991).

Also the combination of both degradable and non-degradable waste increase the rate of habit destruction due to the increasing number of sites necessary for disposal of waste (degradation of habit); plastic-bags, plastic containers, if not properly destroyed may contaminate the soil and also reduces the chance for water percolation into the soil during precipitation. The open air burning of healthcare wastes does not guarantee proper incineration and releases of toxic fumes (dioxin) into the atmosphere from the burning of plastics couple with inefficient and insecure sorting and disposal may allow drugs beyond their expiry date. The practice of unprotected and insecure landfill may pose health hazard to the scavengers and inhabitant at the vicinity (Johannssen, *et al.*, 2000).

***Economic Implication of Hospital Waste***

It has been estimated that American hospitals generate about 6,600 tons of waste every day. Approximately 15% of hospital waste presents significant disposal problems as regulated medical waste, it is also estimated that medical waste disposal costs seven to ten times as much to disposal of waste than conventional solid waste. Poor management of Nigeria's environment is costing the nation roughly US$5 billion annually (Wahab, 1991).

***Environmental Hazards Related to Medical Waste***

The environmental impacts associated with the improper disposal of medical wastes includes; pollutants from medical waste that results into heavy metals and PCBs which are persistent in the environment. Also, the accumulations of toxic chemicals within soil results into the contamination of ground water and decreases water quality which can adversely affects agricultural fields, humans, soil organisms, wildlife, cattle etc. The Bio-accumulation in organism's fat tissues, are bio-magnify through the food chain. The repeated and indiscriminate application of chemicals over a long period of time has serious adverse effects on soil microbial population – reducing the rate of decomposition and generally lowering the soil fertility. Also, pathogen leads to long term accumulation of toxic substances in the soil. The specimens that are collected for analysis have the potential to cause disease and illness in man, either through direct contact or indirectly by contamination of soil, groundwater, surface water, and air. Windblown dusts from indiscriminately dumping also have the potential to carry hazardous particles (Johannessen, Dijkman, Barlone, Henraham, Boyer, and Chandra, 2000).

## 2.6 The Challenges of Hospital Waste Management

In many countries, hospitals still face the challenge of inadequate attention to waste disposal. Hazardous and medical wastes are still handled and disposed together with domestic wastes, posing a great health risk to hospital workers, municipal workers, the public and the environment. In many parts of Africa, wastes are dumped in rivers and streams and it is not uncommon to find collection of a mixture wastes along with the rest of the waste stream (Kgathi and Bolance, 2001; Taru and Kuvarega, 2005). Moreover, most hazardous and toxic wastes are placed on landfills with few safeguards

to protect nearby inhabitants and water sources from contamination. This is usually the case in developing nations (Hardoy, 1992).

The WHO estimates that each year there are 8-16 million cases of hepatitis B Virus, 2.3-4.7 million cases of hepatitis C Virus and 80,000-160,000 cases of HIV due to unsafe injections and mostly due to very poor hospital waste management system (WHO,UNICEF,UNFPA, 1999). Unregulated healthcare waste treatment and disposal has been linked to several public health threats. Solberg (2009) reported that 240 people in Indian State of Gujarat contracted hepatitis B after receiving medical care with previously used syringes acquired through the illegal trade of healthcare waste. The magnitude of the danger posed by some contaminator is captured by the following scenario in South Africa. For example, the Cape Town Municipality of South Africa gave a medical waste disposal company 24 hours to remove amputated body parts and foetuses that had been piling up outside its warehouse for some time. There have been numerous instances where healthcare wastes have been dumped in residential areas. The illegal dumping of healthcare wastes in disadvantaged residential areas has resulted in situations where children have been found playing with medical waste materials such as syringes. For example, the Tygerberg Hospital treated 48 children with AZT (Retrovir) after some were pricked with needles and others ate potentially lethal pills they found in a field in Elsie's River (Leonard, 2004).

A near total absence of institutional arrangements for HCW in Nigeria has been reported by others (Coker *et al.,* 1998), however, various methodologies have been used all over the world to assess and quantify HCW. They include the use of physical observation, questionnaire administration and quantification (Adegbita, Nwafor, Afon, Abegunde and Bamise 2010; Olubukola, 2009; Phengxay, Ikumura, Miyoshi, Sakisaka, Kuroiwa and Phengxay, 2005), as well as checklists (Townend and Cheeseman, 2005)

and private and public records (Coker *et. al.,* 2009). Recent studies in Nigeria have estimated waste generation of between 0.562 to 0.670 kg/day while other gives as high as 1.68 kg/day (Abah and Ohimain, 2011). Although statistics on the quantum of waste produce is scarce, there is similarity and consistency in the way wastes are managed. For example, the study in Lagos by Olubukola (2009) reported similarity in waste data and HCW management practices in two General hospitals which was characterized by a lack of waste minimization or waste reduction strategies, poor waste segregation practices, lack of instructive posters on waste segregation and disposal of HCW with general waste.

With reference to Iran, Taghipour, *et. al.* (2009) reported that healthcare waste has not received enough attention and that medical waste is still handled and disposed off together with domestic waste, creating great health risk to healthcare staff, municipal workers, the public and the environment. Most of the cities in Iran dispose off domestic and health-care wastes together in municipal dumpsites or in poorly designed landfills, or they use on-site incinerators to treat wastes that pose operational and maintenance problems. In Nigeria, it has been observed across all the states that tonnes of healthcare wastes are deposited in open waste dumps and surrounding environments often alongside non hazardous solid wastes (Manyele, 2004). Similarly, Kaserva and Mato, (1999) noted that most Nigerian hospitals had within their premises refuse collection points where all categories of wastes were left, however there were no specific containers as prescribed by WHO for different categories of wastes.

In Akure, Nigeria 65% of hospitals/clinics do not segregate the waste generated in their clinics. Wastes are emptied from the containers in which they were conveyed to the waste collection point in open spaces. Such waste collection points become easy breeding sites for rodents, cockroaches and even domestic animals and people to

scavenge. Sometimes these wastes are left for days and weeks and are subjected to the direct effects of weather. These untreated wastes when beaten by rain are washed into the drainages, rivers, streams and other waters endangering human and aquatic lives. It is also not uncommon to find hospitals with overflowing open and shallow drainages that contain chemical waste from diagnostic laboratories, pharmaceutical wastes from in-patient wards, human waste from theatres and mortuaries which may eventually end up in rivers and streams from which public water supplies are sources and also used for agricultural irrigation (Olubukola, 2009).

Despite the challenges and risks posed by hospital waste management, it is unfortunate that in Nigeria, the international policy that the generator of waste is responsible for its proper management, treatment and disposal has remained on paper and is yet to be implemented. The notion that waste is the responsibility of the government authorities has not enabled waste generators to appreciate the negative impact of improper waste disposal. Although waste is generated from everywhere, of more concern is that of healthcare waste due to its hazardous nature and disease transmission characteristics of the wastes.

In Nigeria, the power to enforce activities that might impact on the environment positively is vested in the Federal Ministry of Environment (FMEnv). In order to reverse the negative trend of hospital waste management, the national policies and legislations on hospital waste management was developed. This includes the following:

1. The National Health Policy (NHP) (1988)
2. National Policy on the Environment (1988)
3. National Environmental Protection Agency (NEMA) Decree No. 58 (1988)
4. National policy on injection safety and healthcare waste management

The policy on injection safety and healthcare waste management seeks to ensure that patients, health workers, communities, and the environment are protected from risk associated with unsanitary and unsafe injection as well as improper treatment and disposal of injection materials and other healthcare wastes. The document hopes to achieve this via stated objectives which include:

1. To provide guidelines for injection and other healthcare waste management practices to all health facilities.
2. To ensure that all healthcare facility have easy access to appropriate disposal facilities or used injection and other health waste.
3. To establish and ensure that proper injection and other healthcare waste management practices are observed at all health facilities and in the communities.
4. To mobilize the community on appropriate healthcare waste management.

Strategies employed to achieve these sets of objectives are:

1. Establish and implement system for ensuring that injection and other healthcare waste are properly managed by person and facilities generating them both in the health sector and in the community.
2. Develop and disseminate guidelines for injection and healthcare waste management.
3. Construction and instillation of injection and other healthcare waste disposal destruction facilities.
4. Safe collection and transportation of sharps, other injection materials and their disposal using incinerators or other environmentally approved means (Babatola, 2008).

However, there is near total absence of institutional arrangement for the management of medical waste and currently there are no regulations, legislation or special edicts on medical waste management.

This is principally due to:

1. Lack of national environmental health policy and regulation.
2. Inadequate legal instrument.
3. Inadequate or non-existing technical capacity (Babatola, 2008).

It is obvious in Nigeria, according to Wahab, (1991) that available literature on medical waste management are not only few but also concentrate on identifying the composition and quantifying the waste generated in urban cities. The poor state of hospital waste management in the country is succinctly captured by Wahab, (1991:45) when he said:

> …is caused by inadequate facilities, poor funding and poor implementation of policies as well as wrong attitude towards waste management. Hence the need to study the healthcare waste management practice, undertaken by healthcare establishment including segregations of waste, types, labeling of containers, methods of disposal, training of personnel, existing documentation and legislation with a view of comparing with the internationally recommended standards.

## 2.7 Safety Measures for Workers on Hospital Waste Management

Health-care waste management policies or plans should include provision for the continuous monitoring of workers' health and safety to ensure that correct handling, treatment, storage, and disposal procedures are being followed. Essential occupational health and safety measures include the following: proper training of workers; provision of equipment and clothing for personal protection; establishment of an effective occupational health programme that includes immunization, post-exposure prophylactic treatment, and medical surveillance.

Ogbonna, *et al.,* (2012), found that in large hospitals, these safety measures are not always observed. In Nigeria, that eye goggle for example, as a safety gadget is not used in waste handling.

Al-Khatib (2006), conducted a study to assess the occupational safety among cleaning workers in Palestinian hospitals and its relation with the medical waste management in these hospitals. They observed the level of occupational safety to be below standard requirements, as protective equipment and clothes were not available for most workers. Similar results were reported in Iran (Farzadkia, *et al.,* 2009), where the authors investigated solid waste management in the eight teaching hospitals of Iran University of Medical Sciences.

In a study carried out among primary health workers in Zaria, Nigeria revealed that the practice of the use of personal protective equipment especially hand gloves was observed by 66% of the staff, however, their use by the staff was not consistent. Worst still, is the danger of exposure to HIV and other infectious diseases especially airborne diseases cannot be overemphasized (Joshua, *et. al.,* 2014).

## 2.8 Theoretical Framework

This section employs sociological theory to explain the impact of hospital wastes management on workers in ABUTH Shika-Zaria. The research derives its theoretical framework from the functionalist theory. Functionalism dates back to the work of Auguste Comte (1798-1857) and Herbert Spencer (1820-1903). It was developed and refined respectively by Emile Durkheim (1858-1917) and Talcott Parsons (1902-1979). Functionalism (also called structural-functionalism) as a theoretical perspective in sociology holds a view of society as a social system that is made up of different parts which are interdependent and interrelated. These different parts perform various

functions towards the maintenance, stability and survival of the social system. Functionalists equate the human society with the human organism which consists of different parts. This analogy between society and an organism focuses attention on the homeostatic nature of social system: social system work to maintain equilibrium and to return to it after external shocks disturb the balance among social institutions (Ogunbameru, 2008).

In order to adopt sociological theory that will adequately explain the problem of the study, the structural-functionalism theorized by Talcott Parsons (1902-1979) is discussed alongside with its four functional imperatives for all "action" systems. That is, his famous AGIL scheme. A function is "a complex of activities directed towards meeting the need or needs of a system" (George and Jeffrey, 2014:243). Using this definition, Parsons believes that there are four functional imperatives that are necessary for (characteristics of) all system – Adaptation (A), Goal attainment (G), Integration (I), and Latency (L) or Pattern Maintenance. Together these four functional imperatives are known as the "AGIL scheme." In order to survive, a system must perform these four functions:

1. Adaptation: A system must cope with external situational exigencies. It must adapt to its environment and adapt the environment to its needs.
2. Goal attainment: A system must define and achieve its goals.
3. Integration: A system must regulate the interrelationship of its component parts. It also must manage the relationship among the other three functional imperatives (A, G, L).
4. Latency (pattern maintenance): A system must furnish, maintain, and renew both the motivation of individuals and the cultural patterns that create and sustain that motivation (George and Jeffrey, 2014:243).

### 2.8.1 Application of the theory

Functionalism talks about functions – all parts work for the good of all. The health system exists to bring about a healthy society. In the performance of function – healthcare, different functions or tasks are allocated to different categories of workers. Because of the nature of the work of the hospital workers, in particular healthcare providers, hospital cleaners, maintenance workers, operators of waste treatment equipment, and all operators involved in waste handling and disposal within and outside healthcare establishments, they are at risk. In this light, ABUTH Zaria as a tertiary hospital is seen has a structure which has different parts that play their roles for the smooth functioning of the hospital.

**Adaptation** as one of the functional schemes implies, for the environment to be adaptable and conducive for hospital workers, patients and the general public, all parts in the hospital must play their roles, the healthcare worker, that is, doctors, nurses, laboratory scientists, pharmacists and the healthcare attendants among others should comply with the international standard of segregating wastes at the source right from point of generation in the wards into different categories. The waste managers must ensure that the waste collectors collect wastes to their final disposal and the waste cleaners clean the hospital premises at accurate and appropriate time to keep the environment clean and adaptable for both hospital workers, patients and the general public.

**Goal attainment** as the second functional schemes implies that, the primary goal of the hospital is to take care of patients. And for the hospital to function and attain this goal, the hospital management board must meet the needs of the hospital workers in general in terms of salary, security, social welfare and healthcare scheme among others. This is to motivate all the workers in various units/departments to play their different roles,

thereby leading to the hospital goal attainment of healthcare services. In situation where one of the motivating factors is lacking, there is bound to be dysfunction in the subsystem (health) and in the entire system (society) thereby defeating the hospital primary goal. According to Premium Times News paper dated April 22, 2017, the Joint Health Sector Unions (JOHESU) OAUTH branch, embarked on strike to press home some demand on harmony in the health sector and promotion on health professionals from CONHESS 14 to 15. This strike left the OAUTH healthcare services remained paralyzed, living patients to their fates and there by defeating the primary goal of healthcare delivery.

**Integration** as the third functional schemes implies that, for social equilibrium to be achieved for proper management of healthcare waste and for the safety of patients, healthcare workers and the environment, this can be achieved most importantly through socialization (i.e. education, training, knowledge and practice) of healthcare workers in the basic culture (i.e. the values and norms) of the hospital waste management in order to reach a consensus on proper management of healthcare waste. One such norm is the segregation of wastes at the source into different categories of color coded plastic bags and bins. According to Abah and Ohimain (2011) observed that, it is only sharps that are segregated at the source into the sharp boxes, while other wastes are mixed up without segregating them into their different colour coded bins. This is also in agreement with Taghipour *et al.* (2009) who making reference to Iran, said that medical wastes are still handled and disposed off together with domestic wastes in most cities with a poorly designed landfill and incinerator for the treatment of wastes which pose operational and maintenance problems. This problems could only be resolve through organizing of seminars, conferences on waste management, enlightenment campaign on waste management and providing the hospital workers in general with pamphlets on

policy guiding waste management among others. In the process whereby there is insufficient socialization of healthcare workers (i.e. education, training, knowledge and practice) or failure to adhere to the values and norms on one part of the hospital (i.e. units, departments, wards, levels), there is bound to be a dysfunctional healthcare system which will lead to improper healthcare waste management, thereby resulting in health implication on hospital workers, environment and the general public.

Furthermore, there are two types of functions that the health system performs – **Latent and manifest functions**. The manifest functions are the intended functions – to heal, and to provide health drugs and equipment for use. The management must in their entire effort see that all the basic healthcare facilities for waste management are provided and that they are in good condition, for this will enhance the work of the healthcare workers, waste collectors and cleaner in the hospital for proper waste management. The unintended or latent function however is that these treatments have unintended consequences in the process of treating patients and in collection of hospital waste by waste collectors and cleaners. Consequently, due to the danger of exposure to diseases which hospital workers face in the process of disposing the used materials, they could be at risk of being infected.

When the wastes are properly disposed of as prescribed by the WHO (1999) standard, then the system is functional but where it is not as is the case in many countries, then the work of the waste workers is dysfunctional as have been identified by Ogbonna, *et al.*, (2011). Where treatment ends up causing more harm to the workers, the population and the environment, then it is dysfunctional and can only threaten the subsystem (health) and by extension, the entire system (society).

The increasing generation of hospital waste which is a special category of waste, needs special training and carefulness for those who handle it to ensure a sustainable environmental health and the prevention of cross infections. Sociologically, everything in society is interconnected and interdependent, thus the handling of hospital waste has significant impact on other aspect of community life, and the improper management of this waste can go a long way in causing illness and imbalance thereby defeating the overall goal of the healthcare system.

Structural functionalism is not left without its shortcomings and criticisms despite Parson's action system of 'AGIL.' It is good to bear in mind that this do not exist in the real world but are rather analytical tools for analyzing the real world. One major criticism of structural functionalism is that it does not deal adequately with history – that it is inherently ahistorical. In fact, structural functionalism was developed at least in part, in reaction to the historical evolution approach of certain anthropologist. It is also unable to deal effectively with the process of social change, that is, it is concerned with the parallel incapacity of the approach to deal with the contemporary process of social change. In addition to this, it is unable to deal effectively with conflicts. In fact, the overall criticism is that structural functionalism is unable to deal with history; change and conflict which have led many to argue that structural functionalism has a conservative bias (George and Jeffrey, 2014:259).

Despite the above short coming of this theory, it is still the adequate theory so far to explain the problem at hand on the assessment of hospital waste management in ABUTH Shika-Zaria, Kaduna State, Nigeria.

# CHAPTER THREE

# METHODOLOGY

## 3.1 Introduction

This section outlines the detailed procedures adopted and provides explanations on how to carry out the research goals. The methodology embraces the specification of the steps and procedures that was employed by the researcher in collecting data for processing. This includes the research design, location of the study, sources of data, method of data collection, population of the study, sample and sampling technique, method of data analysis and ethical consideration.

## 3.2 Research Design

In all researches, the nature of the data governs the methods and the tools of research that may be appropriate for the research (Cagno *et al*., 1999). This study employed survey questionnaire, direct observation and in-depth interview. Also, simple descriptive method and visual sociology was adopted in reporting the findings.

## 3.3 Location of the Study

Ahmadu Bello University (ABU) is the largest University in Nigeria and second largest in Africa, after Cairo University, Egypt (Joshua, *et. al*., 2014). It is located in Zaria, Kaduna State, Nigeria. It was founded on October 4, 1962 as the University of Northern Nigeria. The Ahmadu Bello University Teaching Hospital (ABUTH), Zaria is located less than 3km from Samaru and serves as the main tertiary health referral centre for other health care facilities located in Zaria and Nigeria at large. The hospital started operation on the 25$^{th}$ November, 2005 at its present site in Shika-Zaria and it is currently running both outpatient and inpatient services with a capacity of 700 beds.

The hospital was established on the premise of training of medical students, staff, research and health care delivery. The Teaching Hospital is made up of departments/units, wards and levels with both skilled and unskilled medical personnel that function effectively for the growth and development of the hospital (Joshua, *et. al.,* 2014).

The researcher's choice of this location is influenced by the fact that among all the hospitals located in Zaria, ABUTH is the largest hospital and much waste which calls for proper management are generated from various segments of the hospital. The researcher confirmed this during his pilot study with the assistance of a waste manager who took him round the hospital wards and departments. The researcher also observed that there was so much waste that was generated but left unattended to. In some cases, the bins provided were filled to the brim and there was no indicator for waste to be sorted into different bins. Moreover, it was observed that those involved in cleaning and waste disposal did not wear protective clothes or masks as prescribed by the international best practices. This therefore motivated the researcher to carry out this study in ABUTH, Shika-Zaria.

### 3.4 Sources of Data

In this study, the researcher elicited data from both primary and secondary sources of data. Primary data were generated directly from the respondents through questionnaire and in-depth interview conducted with selected key informants in addition to observation. The secondary data were elicited from the hospital records in addition to other relevant documents from the hospital.

### 3.5 Methods of Data Collection

The collection of data for this study was done via quantitative and qualitative methods of data collection. The researcher employed three instruments of data collection which were survey questionnaire, interview guide and observation check list.

Based on the qualitative method of data collection, the selection of participants for qualitative research was purposive. This was because certain individuals or groups by virtue of their knowledge, experiences, skills and social standing possess in-depth knowledge useful for the study. In this study therefore, twelve (12) key informants were purposively selected for the in-depth interviews out of which only ten (10) were interviewed in the following order: The Chief Medical Director, 1 Doctor, 2 Nurses, 1 Pharmacist, 1 Laboratory Scientists, 1 Healthcare Attendant, 3 Waste Managers and 2 Waste Collectors. The criteria used in selecting these informants include their years of experience and knowledge of hospital waste management along with their willingness to participate in the study. The choice of the researcher to use in-depth interview is driven by the need to elicit detailed information on hospital waste management in ABUTH, Zaria.

Observation is the method of observing the subject matter of the survey and recording the information. Direct observation entails obtaining the information directly rather than through the reports of others (Alamu and Olukosi, 2010). The observation that was used in this study was the covert observation (i.e. non-participant observation). This implies the observer recording the characteristic displayed by the observed that are of interest to him. Observations were supplemented with photographs with the aid of a digital camera (Nikon COOLPIX L25, Japan) which was used to take relevant scenes useful for the study.

### 3.5.1 Instruments for Data Collection

Survey questionnaire was designed as the instrument for the quantitative data collection which was administered to the targeted hospital workers (i.e. Doctors, Nurses, Pharmacists, Laboratory Scientists, Waste collectors, healthcare attendants, management staff and waste manager) in the hospital. The questionnaire was self administered and contains open-ended and closed-ended questions. In regards to the content, the questionnaire contains six sections. Section (A) covers the socio-demographic characteristics of the respondents. Section (B) identifies the types of waste generated in ABUTH Zaria. Section (C) focuses on the attitudes of workers on waste management. Section (D) looks at the effects of hospital waste on workers. Section (E) examines the challenges faced by management on waste management. Section (F) provides safety measures put in place to improve the situation of waste management in ABUTH Zaria.

Interview guide was designed as an instrument for the qualitative data collection in line with the research objectives along with probing questions. The interview was conducted via a tape recorder (WSTER Mini Digital Speaker System) which was used to record an informant's information on hospital waste management in ABUTH Zaria.

Observation checklist was designed as an instrument to guide in the observation. The subjects that were observed are the nurses, doctors, health attendants, waste cleaners and waste collectors, process of waste segregation, waste disposal methods, vehicles used in disposing the wastes, waste treatment and the dumping sites, the reason being that most of the waste collectors and wastes cleaners do not put on personal protective equipment as required by the standard.

### 3.6 Population of the Study

The population of this study includes hospital workers, (i.e. Doctors, Nurses, Pharmacists, Laboratory Scientists, Waste Collectors, Healthcare Attendants and Administrative Staff) of the Ahmadu Bello University Teaching Hospital Shika, Zaria. The Teaching Hospital consists of 34 units/departments with staff strength of 2,626 workers distributed in the Table below (Information Unit ABUTH, Zaria, 2015).

**Table 3.6.1: Numbers of Staff in various Departments of ABUTH, Zaria, as at 25th September, 2015**

| S/No. | Department | No. of staff | | S/N | Department | No. of staff |
|---|---|---|---|---|---|---|
| 1 | Administration | 216 | | 18 | Surgery | 95 |
| 2 | Medical Advisory Committee | 47 | | 19 | Community Medicine | 73 |
| 3 | Library | 5 | | 20 | Ophthalmology | 30 |
| 4 | Biomedical Engineering | 32 | | 21 | Radiotherapy/Oncology | 21 |
| 5 | Nutrition and Dietary | 28 | | 22 | Psychiatric | 20 |
| 6 | Finance and Supply | 156 | | 23 | Family Medicine | 15 |
| 7 | Internal Audit | 32 | | 24 | Dental Surgery | 34 |
| 8 | Health Information Management | 78 | | 25 | Haematology | 34 |
| 9 | Laundry Services | 28 | | 26 | Microbiology | 37 |
| 10 | Medical Social Services | 12 | | 27 | Medicine | 36 |
| 11 | School of Nursing | 147 | | 28 | Obstetrics and Gynecology | 40 |
| 12 | Nursing Services | 1007 | | 29 | Orthopedic Surgery | 43 |
| 13 | School of Post Basic Nursing | 39 | | 30 | Pediatrics | 25 |
| 14 | Pharmacy | 36 | | 31 | Histopathology | 43 |
| 15 | Physiotherapy | 23 | | 32 | Radiology | 25 |
| 16 | Security Services | 55 | | 33 | Chemical pathology | 30 |
| 17 | Works and Maintenance Service Dept. | 78 | | 34 | Anesthesia | 6 |
| | | | | | **Total** | **2,626** |

Sources: (Information Unit ABUTH Zaria, 2015).

### 3.7 Sample and Sampling Techniques

For the purpose of this study, the researcher employed the probability and non-probability methods to obtain data from the respondents. For the probability sampling, the multistage cluster sampling and proportionate stratified sampling were employed while for the non-probability sampling the purposive sampling was employed. The multistage cluster sampling was used to group the 34 units/departments into clusters. In

the first stage, related units/departments of the hospital were grouped into clusters. These are:

**Group (1) Administration**: This consists of the Chief Medical Director's Office, Director of Administration, Public Health Unit, Finance and Supplies, Medical Advisory Committee, Works and Maintenance Department, Security Services, Health Information Management and Internal Audit.

**Group (2) Wards**: This consists mainly of the nursing services and it is made up of the following:

Level 0: Cardiotharacic Unit, Transit Surgical Ward and Delivery Suite (Labour ward)

Level 1: Psychiatric ward, Pediatric surgical ward, special baby care unit

Level 2: Both male and female medical wards – pediatrics emergency, pediatric medical wards, obstetrics and gynecology wards

Level 3: Both male and female surgical wards as well as male and female orthopedic maxillofacial wards

**Group (3)** Laboratory Departments: this consists of Haematology, Microbiology, Chemical Pathology and Histopathology.

**Group (4)** Pharmacy Departments

**Group (5)** Clinics: This consists of General out Patient Dept, Pediatric Out Patient Dept. Medical Out Patient, Surgery Out Patient, Ophthalmology Clinic, Nasara Clinic and Orthopedic Clinic.

**Group (6)** Accident and Emergency Unit

**Group (7)** Theatres: this consists of labour ward theatre, modular theatre and Accident and Emergency theatre.

In the second stage, clusters that generate wastes and where information can be elicited for this study was purposively selected from the group of clusters above which includes all the groups above with the exception of groups 5.

In the third stage, from the group of clusters above, unit/departments that generate the more wastes and where vital and detailed information can be elicited for this study was purposively selected which includes:

Group 1 – Administration: Health Information management and Public Health Unit.

Group 2 – Wards: In Level 0 – Delivery suite, Level 1 - Pediatrics ward, in Level 2 - obstetrics and gynecology ward, and Level 3 – orthopedic surgery ward.

Group 3 – Laboratory Departments: Haematology, Microbiology, Chemical Pathology and Histopathology.

Group 4 – Pharmacy Department: The main pharmacy.

Group 6 – Accident and Emergency Unit

Group 7 – Theatres: labour ward theatre and Accident and Emergency theatre.

### 3.7.1 Sample size determination for the study

The sample size is calculated based on Yamane (1967) formula cited in Israel (2012). The formula is given as:

$$n = \frac{N}{1 + N(e)^2}$$

Where "n" is the sample size,

"N" is the population size,

"e" is the level of precision (±5%)

The total number of staff in ABUTH Zaria according to Information Unit ABUTH, Zaria (2015) is 2626.

$$n = \frac{2626}{1 + 2626\ (0.05)^2}$$

$$n = \frac{2626}{1 + 2626\ (0.0025)}$$

$$n = \frac{2626}{1 + 6.565}$$

$$n = \frac{2626}{7.565}$$

$n = 347.12 \sim 347$

$n = 347.$

Based on the formula, the sample size for the study is 347 respondents.

The proportionate stratified sampling which is a probability sampling was employed to sample respondents from the selected units/departments. The reason for using proportionate stratified sampling was that it allows equal representation of various units/departments being selected. A proportionate percentage was used across each stratum of the group above. Thus:

Formula:

$$\text{Proportionate Percentage} = \frac{\text{Sample Size}}{\text{Population}} \times 100\%$$

Sample size = 347

Selected population = 1,380

$$\frac{347}{1380} \times 100 = 25\%$$

Therefore 25% is used across the strata.

Public Health Unit: $\frac{25}{100} \times 10 = 3$

Health information management: $\frac{25}{100} \times 78 = 20$

Chemical pathology: $\frac{25}{100} \times 30 = 7$

Medical laboratory: $\frac{25}{100} \times 37 = 9$

Histopathology: 25 x 43 = 11
100

Haematology: 25 x 34 = 9
100

Nursing services: 25 x 1007 = 252
100

Obstetrics and Gynaecology: 25 x 40 = 10
100

Paediatrics: 25 x 22 = 6
100

Orthopedic surgery: 25 x 43 = 11
100

Pharmacy: 25 x 36 = 9
100

**Table 3.7.1: Sample Distribution of selected Departments in ABUTH, Zaria**

| S/No. | Selected Departments | No. of staff | Sample size |
|---|---|---|---|
| 1 | Public Health Unit | 10 | 3 |
| 2 | Health Information Management | 78 | 20 |
| 3 | Chemical Pathology | 30 | 7 |
| 4 | Medical Microbiology | 37 | 9 |
| 5 | Histopathology | 43 | 11 |
| 6 | Haematology | 34 | 9 |
| 7 | Nursing Services | 1007 | 252 |
| 8 | Obstetrics and Gynaecology | 40 | 10 |
| 9 | Paediatrics | 22 | 6 |
| 10 | Orthopedic Surgery | 43 | 11 |
| 11 | Pharmacy | 36 | 9 |
| | **Total** | **1,380** | **347** |

***Source: Fieldwork, 2016.***

To select the respondents for this study, availability sampling was employed (i.e. reliance on available subjects). This is because most of the hospital workers who constitute the majority of the population are always on shift or on call. In order to ensure most respondents were reached, efforts were made to get people from the morning and afternoon shifts.

### 3.8 Methods of Data Analysis

The data from survey questionnaire were presented using frequency tables and percentages. This is to ease comparison between or among variables and the range of responses. The data were analyzed using the Statistical Packages for Social Sciences (SPSS) version 21.

For the qualitative component of the study, data were transcribed immediately after the interviews. The transcripts were then read and compared with the voice recorded interviews to check the accuracy of the text and to capture the content related to the aim of the study. This is followed by content analysis of the data based on themes and study objectives. The waste management performance observed and recorded from in-depth interviews and direct observation were assessed using a checklist consisting of six characteristics of waste management descriptors and indicators of hospital waste management by WHO (2004) namely: (i) General management strategy (ii) Waste collection (iii) Waste segregation (iv) Waste recycling (v) Waste storage (vi) Offsite disposal. An overall performance rating was then assigned using the approach outlined in the guidelines suggested by Townend and Cheeseman (2005). This guideline uses a simple table format that links performance with a set of criteria to assess the level of sustainable development associated with the healthcare facility.

### 3.9 Challenges Encountered on the Field

The researcher encountered numerous challenges in carrying out this research work. One of such challenge is from the ABUTH ethical committee who demanded for ten (10) copies of the proposal work and this attracted some financial implications. This had to delay the field work for some months before the researcher could start collection of data.

Secondly, in getting the key informants for the in-depth interview and respondents for the questionnaire proof difficult because of the nature of their job, the researcher has to keep time after time, although at the end the interviewed were done.

Thirdly, there was difficulty in retrieving the questionnaire as the researcher had to exert extra effort in retrieving the questionnaire from both the morning and evening shift, on the process many questionnaire were lost but reasonable numbers were retrieved for analysis.

### 3.10 Ethical Consideration

Ethical approval was obtained from the Ethic and Research Committee of ABUTH, Zaria. The aim of the study was explained to the respondents after which their consents were obtained. They were also informed that their participation in the research was voluntary and anonymous.

# CHAPTER FOUR

# ANALYSIS AND INTERPRETATION OF DATA

## 4.1 Introduction

This section presents the analyses and interpretation of data obtained from the field work. The analysis is based on the objectives of the study under the following sub-themes: socio-demographic characteristics of the respondents at ABUTH Shika-Zaria; The types of hospital waste generated in the hospital; The attitude of workers towards hospital waste management; The effects of hospital waste on workers; The challenges faced by hospital management in managing hospital waste; The safety measures put in place to improve the situations of hospital waste management in ABUTH, Zaria and the discussion of major findings. Questionnaires were administered to 347 respondents out of which 290 were retrieved and most of which were self-administered and for those who were not literate, the researcher assisted them. Also twelve key (12) informants were selected for in-depth interviews out of which only ten (10) key informants were interviewed in the hospital. The quantitative data generated through questionnaire were processed and analyzed using the Statistical Package for Social Sciences (SPSS) Version 21. The qualitative data elicited from in-depth interview were transcribed verbatim and interpreted. Therefore, the analysis and interpretation of the findings were from the quantitative and qualitative sources.

## 4.2 Socio-demographic Characteristics of the Respondents

This section presents the socio-demographic characteristics of the respondents such as, sex, age, marital status, religion, educational level, profession, department/unit and years of experience of hospital workers in ABUTH Shika-Zaria. The essence of this section is to present and analyze the characteristics of the respondents in study area, which is presented in Table 4.2.1.

**Table 4.2.1: Socio-demographic Characteristics of Respondents**

| Variables | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | | 115 | | 39.7 |
| Female | | 175 | | 60.3 |
| **Total** | | **290** | | **100.0** |
| **Age** | M | F | **Total** | |
| 20 – 24 yrs | 26 | 68 | 94 | 32.4 |
| 25 – 29 yrs | 2 | 6 | 8 | 2.8 |
| 30 – 34 yrs | 18 | 30 | 48 | 16.6 |
| 35 – 39 yrs | 12 | 15 | 27 | 9.3 |
| 40 – 44 yrs | 12 | 30 | 42 | 14.5 |
| 45 – 49 yrs | 5 | 9 | 14 | 4.8 |
| 50 – 54 yrs | 21 | 15 | 36 | 12.4 |
| 55 – 59 yrs | 1 | 17 | 18 | 6.2 |
| 60 – 64 yrs | 1 | 2 | 3 | 1.0 |
| 65 and above | 0 | 0 | 0 | 0.0 |
| **Total** | | | **290** | **100.0** |
| **Marital Status** | M | F | **Total** | |
| Married | 75 | 136 | 211 | 72.8 |
| Single | 37 | 30 | 67 | 23.1 |
| Widowed | 0 | 5 | 5 | 1.7 |
| Divorced | 3 | 4 | 7 | 2.4 |
| **Total** | | | **290** | **100.0** |
| **Religion** | M | F | **Total** | |
| Christianity | 60 | 113 | 173 | 59.7 |
| Islam | 54 | 60 | 114 | 39.3 |
| Traditional | 1 | 2 | 3 | 1.0 |
| **Total** | | | **290** | **100.0** |
| **Level of Education** | M | F | **Total** | |
| Primary | 0 | 1 | 1 | 0.3 |
| Secondary | 5 | 3 | 8 | 2.8 |
| Tertiary | 110 | 171 | 281 | 96.9 |
| **Total** | | | **290** | **100.0** |
| **Profession** | M | F | **Total** | |
| Doctor | 45 | 30 | 75 | 25.9 |
| Nurse | 37 | 120 | 157 | 54.1 |
| Pharmacist | 4 | 5 | 9 | 3.1 |
| Medical Lab Scientist | 15 | 9 | 24 | 8.3 |
| Healthcare Attendant | 1 | 7 | 8 | 2.8 |
| Waste Collector | 3 | 0 | 3 | 1.0 |
| Clerical Staff | 0 | 1 | 1 | 0.3 |
| Information Management Officer | 10 | 3 | 13 | 4.5 |
| **Total** | | | **290** | **100.0** |
| **Department/Unit** | M | F | **Total** | |
| Public Health Unit | 3 | 0 | 3 | 1.0 |
| Health Information Management | 10 | 3 | 13 | 4.5 |
| Chemical Pathology | 4 | 3 | 7 | 2.4 |
| Medical Microbiology | 7 | 2 | 9 | 3.1 |
| Histopathology | 6 | 5 | 11 | 3.8 |
| Haematology | 4 | 4 | 8 | 2.8 |
| Nursing Department | 70 | 135 | 205 | 70.7 |
| Obstetrics and Gynaecology | 3 | 7 | 10 | 3.4 |
| Paediatrics | 1 | 5 | 6 | 2.1 |
| Orthopedic Surgery | 5 | 4 | 9 | 3.1 |
| Pharmacy | 2 | 7 | 9 | 3.1 |
| **Total** | | | **290** | **100.0** |
| **Years of Experience** | M | F | **Total** | |
| 1 – 5 | 30 | 58 | 88 | 30.0 |
| 6 – 10 | 15 | 58 | 53 | 18.0 |
| 11 – 15 | 35 | 14 | 49 | 17.0 |
| 16 – 20 | 20 | 10 | 30 | 10.0 |
| 21 and above | 15 | 55 | 70 | 25.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

The gender distribution of the respondents as indicated in Table 4.2.1 shows that out of the 290 respondents, females constituted the majority with 175 (60.3%) as against 115 (39.7%) males. This implies that the females were more willing to participate in the study than their male counterparts, the fact that nursing staff most of whom are females may also explain the higher representation of females in the study.

The age of the respondents shows that majority 96 (32.4%) are within the age brackets of 20 and 24 years, followed by 48 (16.6%) which are within the age brackets 30 and 34 years and 42 (14.5%) which are within the age bracket 40 and 44 years. The age distribution reveals that the young people constituted majority of the respondents in ABUTH Zaria.

On the marital status of the respondents shows that majority 211 (72.6%) are married, while 67 (23.1%) constituted the singles, the widowed and the divorced are few in number in the hospital.

On religious background, it shows that majority 173 (59.7%) practice Christianity, while 114 (39.3%) practice Islam, few of the respondents are traditional worshippers.

On educational background, it shows that a significant proportion 281 (96.9%) of the respondents are tertiary school leavers.

On profession, it shows that majority 157 (54.1%) of the respondents are nurses, followed by the doctors which constitute 75 (25.9%).

On distribution by department/unit it shows that the majority 205 (70.7%) of the respondents are from the nursing services department. On years of experience, the table shows that 88 (30.0%) of the respondents had working experience of 1 – 5 years, followed by 70 (25.0%) who had working experience of 21 years and above.

## 4.3 Types of Hospital Waste Generated in ABUTH, Zaria

Respondents were asked to indicate the types of wastes generated at Ahmadu Bello University Teaching Hospital, Shika-Zaria. Table 4.3.1 presents the various types of wastes generated in ABUTH, Shika-Zaria.

**Table 4.3.1: Types of Wastes generated in ABUTH Shika-Zaria**

| **Types of wastes** | **Frequency** | | | **Percentage** |
|---|---|---|---|---|
| | M | F | **Total** | |
| Plastic bags/containers | 3 | 16 | 19 | 7.0 |
| Used papers | 1 | 5 | 6 | 2.0 |
| Syringes | 0 | 1 | 1 | 0.0 |
| Used X-ray films | 0 | 1 | 1 | 0.0 |
| Bottles | 1 | 0 | 1 | 0.0 |
| Expired drugs | 1 | 1 | 2 | 1.0 |
| Placenta/fetuses/fibroids | 2 | 0 | 2 | 1.0 |
| All of the above | 54 | 96 | 150 | 52.0 |
| No response | 53 | 55 | 108 | 37.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.3.1 reveals that majority 150 (52.0%) of the respondents identified all of the various wastes generated at ABUTH Zaria, which include plastic bags/containers, used papers, syringes, used X-ray films, bottles, expired drugs, placenta and other body fluids from gyneacology wastes, only 19 (7.0%) of the respondents identified plastic bags/containers. More female respondents seem to have more knowledge on types of wastes generated due to the fact that nurses who are mostly females constitute the large number of workers. From the qualitative data, one of the female key informant who is a Nurse in her 40s and a Matron in one of the wards gave a general description of how these wastes are categorized thus:

> Two major types of waste are generated. We have the general wastes and the medical wastes. The medical wastes are further divided into two: the solid waste and liquid waste. All the liquid waste is channelled to the sewage disposal site which is located far away from the hospital premises.

In addition to the above the researcher made an observation on the sewage disposal sites during the course of the field work a photograph was taken as the researcher observe the sewage disposal treatment plant site.




**Plate I: Sewage disposal treatment plant site in ABUTH Shika-Zaria**

The above view confirms that most of the respondents had knowledge on various types of wastes generated in the hospital. Table 4.3.2 present respondent's response on what section generates hazardous wastes in the hospital.

**Table 4.3.2: Section that generates hazardous wastes in the hospital**

| Section that generate hazardous wastes | Frequency | Percentage (%) |
|---|---|---|
| Wards/theatres | 102 | 35 |
| Accident and emergency | 23 | 8 |
| Laboratories | 55 | 19 |
| All sections | 62 | 21 |
| No response | 48 | 17 |
| **Total** | **290** | **100** |

***Source:*** *Field Survey, 2016.*

From Table 4.3.2 reveals that hazardous wastes are mostly generated from the wards/theatre with 102 (35%), while 62 (21%) of the respondents indicates that it is all section of the hospital that generates hazardous wastes. When respondents were asked if wastes were segregated into different types and 204 (70%) affirmed they knew. Only 39 (13%) said no, but 37 (12%) said they did not know.

From observation, it was revealed that, there are posters on segregation of wastes (see plate II) but it was observed that provision was only made for syringes to be segregated into sharp boxes (see plate III). This implies that wastes are segregated into types but not all categories of wastes receive enough attention as to where they should be deposited (see plate IV).




**Plate II: Poster for different categories of segregation**




**Plate III: Poster of sharp segregation**



**Plate IV: None segregated wastes in ABUTH Shika-Zaria**

Observation reveals that posters on waste segregation into different categories right from the point of generation as specified by the best international practices are placed on wall for workers to practice same as indicated in Plate II and Plate III. Medical wastes are segregated into colour coded bins or polyethylene bags marked with biohazards symbols; black bins contain general wastes, yellow bins contains infectious wastes, red bins contain highly infectious wastes while sharps box contains sharps such as needle, broken bottles, blades etc. But not all these wastes are attended to as observed in plate IV where all categories of wastes are mixed up in ABUTH Shika-Zaria.

## 4.4 Attitude of Workers toward Waste Management in ABUTH Shika-Zaria

Table 4.4.1 presents details on the views of respondents on the attitude of workers towards wastes management in ABUTH, Zaria.

**Table 4.4.1: Views of respondents on Attitudes of workers towards waste management in ABUTH Shika-Zaria**

| **Option** | **Agreed** | | | **Strongly Agreed** | | | **Disagreed** | | | **Strongly Disagreed** | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | F | **Total** | M | F | **Total** | M | F | **Total** | M | F | **Total** | |
| Hospital wastes are not problem to worry about | 7 | 24 | 31 (11%) | 9 | 20 | 29 (10%) | 34 | 60 | 94 (32%) | 65 | 71 | 136 (47%) | **290 (100%)** |
| Attitude of workers towards hospital waste management is an important issue to be considered | 57 | 64 | 121 (42%) | 47 | 97 | 144 (50%) | 7 | 9 | 16 (6%) | 4 | 5 | 9 (2%) | **290 (100%)** |
| Workers attitude towards hospital waste management is satisfactory | 36 | 64 | 98 (34%) | 21 | 33 | 54 (19%) | 46 | 56 | 102 (35%) | 12 | 24 | 36 (12%) | **290 (100%)** |
| Hospital waste management is a collective responsibility of each and every hospital worker | 54 | 78 | 132 (46%) | 33 | 85 | 118 (40%) | 9 | 19 | 28 (10%) | 4 | 8 | 12 (4%) | **290 (100%)** |
| Hospital waste management add extra burden to hospital workers | 31 | 71 | 102 (35%) | 8 | 38 | 46 (16%) | 35 | 59 | 94 (33%) | 16 | 32 | 48 (16%) | **290 (100%)** |
| Hospital workers' training on hospital waste management is satisfactory | 31 | 39 | 70 (24%) | 18 | 22 | 40 (14%) | 28 | 98 | 126 (43%) | 21 | 33 | 54 (19%) | **290 (100%)** |
| Hospital workers segregate wastes at the source where they are generated. | 55 | 75 | 130 (45%) | 22 | 32 | 54 (19%) | 29 | 42 | 71 (24%) | 12 | 22 | 35 (12%) | **290 (100%)** |
| Positive attitude towards hospital wastes disposal increases financial burden on waste management. | 23 | 37 | 67 (23%) | 17 | 20 | 37 (13%) | 40 | 64 | 104 (36%) | 41 | 41 | 82 (28%) | **290 (100%)** |

***Source:*** *Field Survey, 2016.*

Respondents' attitudes on wastes management were sought in this section. The finding reveals that most of the workers at ABUTH Shika-Zaria were concerned about management as indicated by the majority 136 (47%) who strongly disagreed and 94 (32%) who disagreed with the view that hospital wastes are not a problem to worry about. In other words, the overwhelming majority are of the view that it is serious enough to deserve attention as the female genders were more concerned that waste should be a thing to worry about. This is further supported by those who agreed 121 (42%) and 144 (50%) who strongly agreed with the view that attitudes of workers towards waste management is an important issue to be considered. Despite such optimism, most respondents were not impressed with the attitude of workers towards wastes management as only 138 (47%) said they were not satisfied with workers' attitude and majority were female respondents. The majority 250 (86%) of the respondents however, were in agreement that hospital wastes management should be the responsibility of all with the female respondents as the majority. This could be due to their role as the home managers. While on wastes management adds more burdens on workers, there was no clear majority as only 148 (51%) agrees. Respondents were clearer on the adequacy of the training staff in charge of wastes management receives. Majority of the workers which constitute 180 (61%) of the respondents were not in agreement that staff training is satisfactory. Majority of the respondents i.e. 184 (64%) however acknowledged the efforts made to segregate wastes at the source from where they are generated.

On the whole, majority of the respondents 186 (64%) were equally against the view that positive attitude towards wastes disposal would incur further financial commitment. Such individuals were more concerned that the right thing be done so as

to avert infection or other complications. And paying more attention to wastes management; protects more people, and then it is worth the cost.

### 4.5 Effects of hospital waste on workers in ABUTH, Zaria

This section deals with the effects of hospital wastes management on workers in ABUTH Zaria. The results are presented in Table 4.5.1 below.

**Table 4.5.1: Effects of Hospital Wastes on Workers**

| **Effect of hospital wastes on workers** | **Frequency** | | | **Percentage** |
|---|---|---|---|---|
| | M | F | **Total** | |
| Diseases/infections | 78 | 110 | 188 | 65.0 |
| Create burden in the work place | 21 | 53 | 74 | 26.0 |
| Other specify (chemical contamination) | 4 | 1 | 5 | 1.0 |
| No response | 12 | 11 | 23 | 8.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.5.1 reveals that majority 188 (65%) of the respondents are mostly females and they maintained that diseases/infections was a major effect of wastes on workers. Respondents were further asked if they had ever sustained injuries in the course of their work, 152 (52%) of the respondents said they had not experienced injuries in the course of healthcare delivery and disposing of wastes, while 116 (40%) admitted that they had injuries.

Further investigation revealed that the respondents admitted that needle piercing was the most common occupational hazard they experienced. The health implication of such piercing cannot be overlooked especially in view of the incidence of Hepatitis and HIV/AIDS. Table 4.5.2 presents the details on the types of injuries below:

**Table 4.5.2: Type of injury sustain by workers in ABUTH, Zaria**

| **Types of injuries** | **Frequency** | | | **Percentage** |
|---|---|---|---|---|
| | M | F | **Total** | |
| Cut | 13 | 16 | 29 | 10.0 |
| Broken bones | 16 | 9 | 25 | 8.0 |
| Needle pricking | 44 | 60 | 104 | 36.0 |
| Others specify (spills of blood into the eyes) | 0 | 2 | 2 | 1.0 |
| No response | 42 | 88 | 130 | 45.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.5.2 further reveals that majority of the respondents 104 (36%) admitted that needle pricking is the most common occupational hazard on healthcare workers and most especially on the female gender, the implication is that as the home manager and one who is close to the children and their husband, she could transmit infection to them, thereby putting the lives of her family in danger.

In an interview on injury as a result of needle pricking with a female nurse in one of the wards, in her words:

> Actually, as for me, I had sustain injuries especially that of needle piercing in the course of my work as a nurse, I had also had a cut but the good thing is that I had taken vaccine to prevent me against any infection.

Another male key informant who is a waste collector from the public health unit had this to say:

> Personally me I have never gotten injury, but I have been working over 6 years in this department, I have seen incidence from wastes disposal. The incidence I have seen and is the one I am seeing up till now is nothing but needle piercing. The reason why is because we use to use plastic bag to contain needle. But now we have big containers to pack them. So atleast there is an improvement even though all the wastes are packed into the plastic bins.

Respondents were asked if they reported the incident of occupational hazard to the appropriate authority. Over one half 148 (51%) did not but 142 (49%) of the respondents indicated that they did. This implies that majority of the hospital workers do not report cases of accident in the course of healthcare delivery or waste disposal

and this may have serious implication on them and their families and in the case of infectious diseases, other staff and parents could be at risk too.

On the response from the hospital authority, most were given sick leave and free treatment. Table 4.5.3 provides details on the views of respondents on the hospital authority and workers' health.

**Table 4.5.3: View of respondents on hospital authority and worker's health**

| View of respondents on hospital authority response to worker's health | Frequency | | | Percentage |
|---|---|---|---|---|
| | M | F | Total | |
| Nothing | 16 | 33 | 49 | 17.0 |
| Sick leave | 21 | 25 | 46 | 16.0 |
| Free treatment | 13 | 30 | 43 | 15.0 |
| Other specify (laboratory test) | 1 | 2 | 3 | 1.0 |
| No response | 64 | 85 | 149 | 51.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.5.3 reveals about one quarter of the respondents who reported that due to their injuries they were given sick leave by the authority, while some 43 (15%) did say they received free treatment. This is contrary to the opinion of one of the male key informants who is a waste collector from the Public Health Unit. He recalled his ordeal and maintained that:

> As a waste collector I have had injury but nothing other than needle pricking. This is because the plastic bags used can easily be torn and most of the time even with our hand gloves needle pierces me. For occupational hazard compensation, there is nothing like that. We are treated, but they deduct the money from our salary via NHIS so we pay, the treatment is not free.

On whether or not the respondents had been ill as a result of exposure to hospital wastes, 87 (30%) of the respondents indicated that they had ever been ill as a result of exposure to hospital wastes as opposed to 157 (55%) who had not experienced illness. On the nature of illness they suffered from, most had to do with fever, malaria and other related sicknesses. Table 4.5.4 shows the nature of illness as follows:

**Table 4.5.4: The Nature of Illness on wastes related diseases on workers**

| Nature of illness | Frequency | | | Percentage |
|---|---|---|---|---|
| | M | F | **Total** | |
| Nauseated, fever, malaria, typhoid, vomiting | 25 | 37 | 62 | 21.0 |
| Allergic skin reaction | 18 | 33 | 51 | 18.0 |
| Respiratory tract infection | 19 | 9 | 28 | 10.0 |
| No response | 53 | 96 | 149 | 51.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.5.4 reveals that some of the workers 62 (21%) reported falling ill due to their exposure to wastes. Fever and allergic skin reaction were the major challenges respondents faced particularly females as indicated. Again, the implication is not farfetched as they could infect relations, friends and even patients as the case may be. An interview with a male key informant who is a wastes collector with the public health unit had this to say:

> Ah a, if is that one, several times I was sick like vomiting, fever, body pain, stomach upset when packing the wastes. Even now I am not too strong because of the inhaling of odour from the waste, we the wastes collectors normally fall sick very well o. it is only God that is protecting us.

In an interview with another female cleaner from the Royal Care Company, she had this to say:

> I don't like the odour especially when the bins are full they smell horribly. The last time was that I fell sick, I started vomiting and my body system change. This hospital wastes is terrible fa, oga, I cannot say this is the number of times I was sick because we use to pack them from the wards into the bin…. Yes there is cover nose even that many time does not prevent the odour, most especially when different kind of wastes are mixed up. You cannot just understand.

The female constitute the largest wastes cleaners as there are about three companies in charge of cleaning the wards and the environment, many of them are infected with one sickness or the other.

Cross-tabulation further reveals which profession had suffered one type of the injury most in the cause of wastes disposal and healthcare delivery.

**Table 4.5.5: Professions of respondents by types of injuries sustained**

| Profession | Type of injury | | | | Total |
|---|---|---|---|---|---|
| | Cut | Broken bone | Needle pricking | Others specify (spills of blood into the eyes) | |
| Doctor | 8 (5.0%) | 9 (6.0%) | 24 (15.0%) | 0 | 41 (26.0%) |
| Nurse | 13 (8.1%) | 12 (8.0%) | 64 (40.0%) | 0 | 91 (56.1%) |
| Pharmacist | 2 (1.3%) | 0 | 3 (2.0%) | 1 (1.0%) | 6 (4.3%) |
| Med. Lab. Sci. | 2 (1.3%) | 0 | 10 (6.3%) | 0 | 12 (7.6%) |
| Healthcare Attendant | 4 (3.0%) | 3 (2.0%) | 0 | 0 | 7 (5.0%) |
| Waste Collector | 0 | 1 (1.0%) | 1 (1.0%) | 0 | 2 (2.0%) |
| **Total** | | | | | **160 (100%)** |

***Source:*** *Field Survey, 2016.*

The cross-tabulation presented in Table 4.5.5 further reveals that nurses had the highest experience of all the types of injuries ranging from cuts, broken bones and needle pricking. This could be due to the fact that nurses are always with the patients in the course of healthcare delivery even more so than the doctors, pharmacists and medical laboratory scientists. The nurses are the patients care giver because they are the ones who administer drugs prescribed to the patients, record the patients' health condition, gives injections most of the time and so on. The Table further reveals that the doctors are the next in line to the nurses, the reason being that they work hand-in-hand with the nurses most of the time and also be with the patient in the wards.

Table 4.5.6 is a further cross-tabulation of profession with nature of illnesses they have contracted in the course of discharging their work.

**Table 4.5.6: Professions of respondents by nature of illnesses**

| Profession | Nature of illness | | | Total |
|---|---|---|---|---|
| | Nauseated, fever, malaria and typhoid | Allergic to skin diseases | Respiratory tract infection | |
| Doctor | 25 (18.0%) | 16 (11.0%) | 12 (9.0%) | 53 (38.0%) |
| Nurse | 29 (21.0%) | 30 (21.3%) | 13 (9.2%) | 72 (52.0%) |
| Pharmacist | 1 (0.7%) | 1 (0.7%) | 1 (0.7%) | 3 (2.0%) |
| Med. Lab. Sci. | 3 (2.0%) | 2 (1.3%) | 2 (1.3%) | 7 (4.0%) |
| Healthcare Attendant | 1 (0.7%) | 2 (1.0%) | 0 | 3 (2.0%) |
| Waste Collector | 1 (0.7%) | 0 | 0 | 1 (0.7%) |
| Information Mgt. | 2 (1.3%) | 0 | 0 | 2 (1.3%) |
| **Total** | | | | **141 (100%)** |

***Source:*** *Field Survey, 2016.*

Table 4.5.6 reveals the professions of respondents by nature of illness they have encountered. Nurses are associated more with the various categories of illnesses such as feeling of being nauseated, fever to malaria and typhoid. They are also allergic to skin diseases along with respiratory tract infections; the reason being that they are closer to the patients in the course of healthcare delivery and in disposing of waste and so they are more susceptible to infection.

## 4.6 Challenges of hospitals waste management in ABUTH Zaria

Respondents were asked about the challenges being faced by the management on hospital waste management. A good number 197 (68%) of the respondents indicated they were aware of the challenges of hospital waste management, while 63 (22%) of the respondents indicated that they were not aware, while 30 (10%) did not respond. On who is responsible for waste management, most respondents agreed it is the responsibility of the Public Health Unit. See details below in Table 4.6.1.

**Table 4.6.1: Unit responsible for healthcare waste management in ABUTH**

| Unit responsible for waste management in ABUTH Zaria | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| | M | F | **Total** | |
| Public Health Unit | 60 | 94 | 154 | 53.0 |
| Don't Know | 13 | 31 | 44 | 15.0 |
| All Staff | 32 | 40 | 72 | 25.0 |
| No response | 10 | 10 | 20 | 7.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.6.1 indicates that about one half 154 (53%) of the respondents identified the Public Health Unit as responsible for the healthcare waste management while few 72 (25%) of the respondents said it is the responsibility of all the staff to manage waste, while 44 (15%) said that they did not know. That both the female and male genders indicated that all staff should be responsible for wastes management shows that individual responsibility is key to successful wastes management. So if people at individual level are conscious of wastes and the implication they pose to health of people, then it behooves that all hands be on deck to ensure no one is unnecessarily exposed to the dangers of improperly disposed wastes.

From the qualitative data, it was discovered that hired hands outside Public Health Unit that is in charge of wastes in the hospital were recruited to help in wastes management. According to one of the male key informant from the public health unit, between the age 40 and 44, who is the operating manager in his word:

> Yes, there is eh, there is outside parties like em Cananand, Royal Care and Paul Davis, they are the one that use to packing it from the wards to the big plastic dustbin. These companies help to clean the environment, wards and offices; they are not the one in charge of the hospital waste disposal. It is our men from Public Health Unit that will pack the wastes to a junction where they will finally carry them to the final disposal. It is the Public Health Unit that is responsible for their performance.

In order to get more information on the process of waste disposal at ABUTH Zaria, interviews were conducted with two managers, one each from Paul Davis and Royal

Care Cleaners. In addition, the Chief Medical Director (CMD) also was interviewed on the management of Hospital Waste. The interview with the CMD reveals that there is a unit vested with the responsibility of managing the hospital waste which is also aided by three other private companies who undertake cleaning services in the hospital. In his words:

> We have the Public health Unit which is directly involved in the disposal of the waste. The management of waste in the hospital environment is very important and the fact that hospital waste is a very specialized waste, we definitely have a system that takes care of the waste right from the point of generation, how they are collected, conveyed and disposed. We employ the services of three companies. They are responsible for collecting the waste into plastic bins while the Public Health Unit conveys the waste to the dumping site…they are Paul Davis, Royal Care Cleaners and Cananand.

This was further confirmed by the interview conducted with the managers of the two companies. In the words of Paul Davis Company's manager:

> We are employed by the hospital, so basically the hospitals are the one who recommend payments, and they are actually the one who pays us…yes they pay us before we pay our workers. It's a contract, there is an agreement they contracted out their cleaning services to us.

When asked why they undertake only cleaning services and not disposal of wastes, his response was:

> "We are not directly involved with the disposal it is the Public Health Unit that can answer"

Similarly, the manager of the Royal Care Cleaners when asked about their operations admitted that:

> Yes we are three Paul Davis, and 'Cananand' I met Paul Davis here am just eleven years here but the other company is about six years or more now and they are giving them psychiatry or where….I don't know? Another department called Public Health Unit they are the ones responsible for the hospital, I as a contractor Paul Davis as a contractor and the other company we are all in charge of cleaning services.

With regards to an organized system or operative staff for management of hospital waste, findings from the qualitative study reveal that the hospital contracted out their waste management services to three companies alongside the Public Health Unit. The private companies take care of the waste collection into waste bins within the hospital while the Public Health Unit is responsible for the conveyance and final disposal of the waste. The responsibility is defined and supervised by the hospital management particularly the Public Health Unit. Observations also confirm three sets of cleaners: some wearing brown gowns, which are for the Public Health Unit, another group wears blue uniform, which are for Royal Care Company, Yellow T-shirts for Paul Davis Cleaners and Ash colour for Cananand cleaners.

When asked about any special budget for hospital waste management in an interview with the CMD, his reply was that:

> The budget we have here mainly is to take care of the staff involve in the management of this waste. We also make budget for the procurement and replacement of the equipment required for the collection, transportation and final disposal of the waste.

However, the CMD was asked if there was any laid down policy on waste management in ABUTH, his response was:

> ah, policy, em there is no laid down policy, but there are committee appointed to inform handlers of wastes on how to go about the wastes.

The mangers of the contracted cleaning companies also confirmed that they draw their funds from the hospital management. The view by the manager of Royal Care Cleaner captures this when he said:

> Eh, hospital directly cannot pay, I think it should be government, hospital is the government, the government is the government, whether the money comes from the management or the government I don't know, all I know is that they pay us regularly.

The above view is corroborated by the other manager from Paul Davis when he acknowledged that:

> Basically the hospital management is the one that recommend payments. They are also the one that actually pays us, though it is still a federal government work but the management are the one that handle payment not the federal government directly.

From the interview with the key informants, the data gathered reveals that though the hospital is owned by the federal government and funded by the federal government through the Federal Ministry of Health; its internal budget has provision for waste management.

On Training on waste management and wearing of Personal Protective Equipment by operative staff; an interview with the CMD:

> If you remember I told you that from the budgets we make sure the operative staff involved in handling of the waste wears special protective equipments like gloves and special boots.

With the Royal care manager, he said:

> Yes we do give of one week whereby the new staff are employed, just some few months ago we did one week training, the training started from 6:00am-5:00pm we only go for an hour break at 12noon, we give the training and we have scope of work, you understand?, we don't just give them employment because the work we do here is very very sensitive ah ah ah. We give them uniforms, we give them hand gloves, we give them hand rubber brush the one at your back, we call it hand rubber brush, so that by the time they are sweeping they won't be having back pains too much. We give them nose scarf to cover their nose that they should not inhale dust and any stinking odor.

With the Paul Davis manager

> Yes o, there is a training period when we employ them we show them what to do if we see that they can do what is expected of them then we employed them. Over time, we take other courses after three months. This training is to refresh their memory on what they are expose … sometimes before they start work, there is these we called casual staff they do only two times in a week though they don't collect as much as the employed ones we try to show them what to do get them acquainted to what we are doing before they are move to permanent staff.

### 4.6.1 Level of Satisfaction on wastes management in ABUTH Zaria

Respondents were asked to rate their level of satisfaction with the way ABUTH manages its wastes. The majority were not too impressed. See Table 4.6.2 for details.

**Table 4.6.2: Workers rating on hospital waste generated in ABUTH Zaria**

| Rating of waste generated in ABUTH Zaria | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| | M | F | T | |
| Very satisfactory | 17 | 28 | 45 | 16.0 |
| Somewhat satisfactory | 60 | 78 | 138 | 47.0 |
| Not satisfactory | 30 | 66 | 96 | 33.0 |
| No response | 8 | 3 | 11 | 4.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

In rating the management of waste generated in this hospital, the finding reveals that the majority which constitute 138 (47%) of the respondents indicates that it is only somewhat satisfactory, 96 (33%) of the respondents indicate that it is not satisfactory. This implies that waste management in ABUTH Zaria is not too satisfactory as indicated by the majority who mentioned "somewhat satisfactory". This is in congruence with an interview with a male key informant from the histopathology department, a laboratory scientist, in his words:

> Yes there is improvement currently, since em observers, there are some observers that have been recently, I think they are the waste management committee has come up with some very good international ideas, such as em disposing sharp objects, segregating objects, wastes itself and so many other things that are in place. This has improved our waste management, though not perfect.

Further inquiry was made to find out from the respondents whether hospital wastes are collected daily from the wards and this finding reveals that 200 (69%) of the respondents indicated yes, that medical wastes are collected from the wards daily, 80 (28%) of the respondents indicated no, that medical wastes are not collected daily from the wards while 2 (1%) of the respondents indicated that they did not know.

An interview was conducted concerning the current challenges the hospital management is being faced with right now. In an interview with the CMD:

> You know, hospital waste is a special waste and the people who handle it are supposed to be trained, however much casual workers find their way in to the work through this private cleaning companies, only few people are trained, and so even if you give them the protective equipment to use because they don't know the risk of not using it, they do not see the necessity to take the precautionary measures, casual workers will not heed precautionary measures…"

With Royal Care Manager

> Eh... the challenges I am facing here in the north I don't have such in the south, east, and other parts of the country. It seems 90% of them are innocent to the usage of toilet, ….researcher…do you mean ignorant or innocent no no no don't use that English, that is why I am giving you a very simple one. You see, eehh.. the brought up of every individual are differ, some of them are from the village, they have not seen anything called closet before, they defecate in the bush or this pit latrine and by the time they come to a place like this, all they do they prefer to defecate on the floor, they go to the bathroom where they are suppose to bath they will defecate there, or they will put leather to defecate inside and come put it into the closet which now bring blockage for others to go inside…the challenges are too many they won't go to the bathroom to bath, they prefer outside to bath there , they give you problem every day, they turn the bathroom to laundry, it's now that we are educating them about where to wash in the places provided. Atimes the places you've swept and mop after 3minutes you see them littered, they will see dustbins in front of them but they will not put drop things into it, they drop it anywhere so we are here 24hrs to be picking as they are dropping the life style here is very ridiculous but there is nothing we can do, God will help us.

With Paul Davis Manager:

> Challenges In what way? Is it payment, or management the waste? …Researcher…, wastes management. The major challenge is that people don't understand , when you train this set of people, after a while they go, the new people before you get to train them it will take some time and before they become aware of what is happening, it will take some time they may not know. Am even talking about doctors and nurses. Ours is to take out the waste, theirs is to make sure that they put it in the right places. And some of the patients too they don't know. So the challenge here is that; nonchalant attitude on the part of the medical personnel, and ehh will I say ignorance in the part of the patients?...because they don't know. They are ignorant that these things are harmful or not so they just throw things on the floor they just belief a cleaner is around.

The response of the Paul Davis manager on how the floor is littered all the time "because they just belief a cleaner is around" explain why the cleaners work schedule is hectic. In some cases, they have to clean an area up to three times a day. Table 4.6.3 shows how often wastes are collected.

**Table 4.6.3: Number of times wastes are collected**

| Number of times wastes are collected | Frequency | Percentage (%) |
|---|---|---|
| Once a day | 137 | 47.0 |
| 2 – 3 times a day | 67 | 23.0 |
| Once in a week | 19 | 7.0 |
| 2 – 3 times a week | 8 | 3.0 |
| Once in a month | 3 | 1.0 |
| No response | 56 | 19.0 |
| **Total** | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.6.3 reveals that 137 (47%) of the respondents indicated that wastes are collected from the wards once in a day, 67 (23%) of the respondents indicated 2 – 3 times a week, 19 (7%) indicated once in a week, 8 (3%) indicated 2 – 3 times a week while 3 (1%) indicated once in a month. This suggests that ABUTH waste management staff should put more effort in collecting waste from the wards if possible thrice a day as majority indicated once in a day.

An interview with a male key informant who is a laboratory scientist supports the above statement:

> emm our major issue is may be the time frame in which wastes are being collected from the lab, most time it is once a day and is not suppose to be like that, at least 2 times a day to collect the wastes. Sometimes too we need to send to the Public Health Unit to inform them that our bins are full before they come and collect the waste.

An enquiry was made as to whether infectious wastes are labeled with biohazards symbols, and this shows that 95 (33%) of the respondents indicated yes, that infectious wastes are labeled with biohazard symbols, 187 (64%) indicated no, that infectious wastes are not labeled with biohazard symbol, while 8 (3%) indicated that they did not

know. This is a clear indication that in ABUTH Zaria infectious wastes are not labeled with biohazard symbols.

This fact is corroborated by one of the male key informant, a waste collector during an interview session. In his words had this to say:

> honestly speaking, if I will say the truth, actually they were supposed to be labeled with biohazard symbols, but you will only find out that it is only the sharp boxes that are labeled with biohazard symbol. Even each container is supposed to be coloured coded and with their specific symbols but it is not so here in this teaching hospital. Help us tell the management to put things in shape.

An observation was made and a photograph of wastes containers without symbols was taken.



**Plate V: Wastes containers without biohazard symbols in ABUTH Shika-Zaria**

From observation, it was observed that the containers are not colour coded and without biohazard symbol to specify which category of waste they contain. These bins are filled up with different kinds of wastes and it is not in line with the recommended practice.

Respondents were further asked on how the hospital segregates sharps. Most indicated through the use of sharp boxes. See Table 4.6.4 for detail

**Table 4.6.4: Sharps Segregation in ABUTH Zaria**

| Segregation of sharps | Frequency | Percentage (%) |
|---|---|---|
| Use of safety boxes | 213 | 73.0 |
| Puncture proof containers | 40 | 14.0 |
| Plastic bags | 15 | 5.0 |
| Empty fluids containers | 3 | 1.0 |
| Other specify (disinfectant containers) | 11 | 4.0 |
| No response | 8 | 3.0 |
| **Total** | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

From Table 4.6.4, the finding shows that 213 (73%) of the respondents indicated that safety boxes are used in segregating sharps, 40 (14%) of the respondent indicated puncture proof containers, while 15 (5%) indicated plastic bags. This implies that the hospital segregate sharps with the use of safety boxes.

In a qualitative study, an interview with a key informant who is a female nurse has this to say:

> We segregate sharps into sharp boxes, but the only thing is that we are in short supply of sharp boxes; sometimes you find the sharp boxes fill to the brim, nowhere to separate them. That is it, we use sharp boxes.

When further asked to find out whether the hospital uses colour code for different types of hospital waste. The findings reveal that 172 (59%) of the respondents indicated that colour codes are used for different types of wastes, 108 (37%) of the respondents indicated no, while 5 (2%) of the respondents indicated they did not know. This however is not always the case in the hospital.

An interview with a male key informant, a waste collector reveals a contrary view when he said:

> emm yes, I can say to some extent they are colour coded plastic bags liners that were suppose to contain different types of waste and even their symbols. But as a waste collector we normally found that the medical wastes are mixed up with domestic wastes in these plastics bags without separating them. `

During an observation at the waste disposal site, photographs were taken to affirm the interview above.



**Plate VI: Colour coded plastic bags without symbols in ABUTH Shika-Zaria**



**Plate VII: Colour coded plastic bags mixed up with different types of wastes in ABUTH Shika-Zaria**

Ideally, the colour coded plastic bags were to contain different categories of wastes and not mixed up. The black plastic bag contains non-infectious wastes such as papers, packaging materials, bottles, cans; food remains etc. while the red plastic bag contains highly infectious wastes such as blood bag, extracted teeth, used test tubes and anatomical wastes e.g. placenta amongst other. The yellow bag contains infectious wastes such as dressing bandage, gauze, gloves and IV fluids lines etc.

Respondents were asked whether used syringe needles are recycled for reuse in the hospital. Majority of the respondents which constitute 202 (70%) indicated no, only 51 (18%) of the respondents indicated yes, that syringe needles are recycled for use, while 32 (11%) of the respondents indicated that they did not know. This implies that majority of the respondents indicated that syringe needles are not recycled for use, the practice was not altogether tight proof as a few still manage to recycle needles.

Respondents were further asked to find out if sharp container or needle destroyers are available always. The finding was that 95(34%) of the respondents indicated yes, that sharp container or needle destroyer is available always, 136(48%) of the respondents

had contrary view as indicated by a no answer, while 50(18%) of the respondents indicated that they did not know. This suggest that majority, almost half of the respondents support the view that sharp containers or needle destroyer are not available always.

This was also confirmed during an interview with a female key informant who is a nurse and a matron, who said:

> This is one of the major problems in this hospital; we are in short of sharp boxes to put the sharps most of the time, as you see right now our sharp box is filled up. For needle destroyer don't talk about that one.

This was in line with the observation been made during the field study. Here is a photograph taken.




**Plate VIII: Sharp box awaiting disposal in ABUTH Shika-Zaria**

This reveals that sharp boxes are in limited supply in the hospital as most of them are filled up with needles.

Furthermore, question was asked on whether the healthcare wastes are stored before disposal and it reveals that 121 (42%) of the respondents affirmed that wastes are stored before disposal, 83 (29%) of the respondents indicated no, while 78 (27%) of the

respondents indicated that they did not know. This implies that majority of the respondents indicated that wastes are stored before disposal. In reality, what respondents called storage is big plastic garbage bins used for depositing wastes. Sometimes these bins are filled up before the end of the day and are visible to visitors who come into the wards during the visiting hours of 4 – 6pm.

One of the interviews with the Public Health Unit waste manager captured this aptly when he said:

> There is no building where wastes are stored o, you will only see that most of the time the wastes are stored in the front of the wards or most at time the junction in the front of the A & E ward, before they are carried with our vehicle to the final disposal site.

An observation made during the field study, it was observed that wastes are normally stored in the front of the wards or at the front of the emergency ward as shown in plate IX below:



**Plate IX: Wastes stored at the front of A & E Unit in ABUTH Shika-Zaria**

This reveals that there is no purpose built waste storage facility in ABUTH Zaria, this expose worker and visitors to the danger of improper waste management.

### 4.6.2 Wastes Treatment

In another section it was asked whether wastes are treated before disposal, it was revealed that 114 (39%) of the respondents indicated no, 54 (19%) of the respondents indicated yes, that wastes are treated before disposal, while 108 (37%) of the respondents indicated that they did not know. This suggested that wastes are not treated in the hospital before disposal. Most of the time, treatment of wastes refers to incineration as shown in Table 4.6.5 below.

**Table 4.6.5: Waste treatment methods**

| **Method used in the treatment of waste** | **Frequency** | | | **Percentage (%)** |
|---|---|---|---|---|
| | **M** | **F** | **T** | |
| Autoclaving | 25 | 37 | 62 | 21.0 |
| Incineration | 48 | 59 | 107 | 38.0 |
| Encapsulation | 15 | 26 | 41 | 14.0 |
| Waste burial | 12 | 26 | 38 | 13.0 |
| Chemical disinfection | 8 | 21 | 29 | 10.0 |
| Others specify (Modern technology) | 3 | 0 | 3 | 1.0 |
| No response | 4 | 6 | 10 | 3.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

In order to test the respondents' knowledge of waste treatment, they were asked to indicate the methods of treatment of wastes they knew. Quite a number showed they are knowledgeable about how wastes are treated. The majority 107 (38%) indicates that wastes were treated by incineration. Obviously, open burning by fire is the most common method of destroying wastes. Autoclaving is another visible form in the hospital which explains why it rank second among the methods of waste treatment mentioned.

An interview with a male key informant who is a waste collector reveals that the wastes are not treated before final disposal because of an absence of a functional incinerator in the hospital. He said:

> Eh, em, the current practice of ABUTH Zaria about waste treatment is that they collect wastes everyday but these wastes are not treated. Our incinerator is not good at all, this is almost or more than four years the thing spoils. So we burn them openly in a field close to the incinerator.

An observation was made during the field study to the treatment site where the incinerator is located. A photograph was taken by the researcher in support of the statement.



**Plate X: Non-functional incinerator in ABUTH Shika-Zaria**



**Plate XI: Sharps awaiting incineration in ABUTH Shika-Zaria**

The observation reveals that, the incinerator plant is not functioning and sharps majorly needles were stored inside the incinerator plant as revealed in Plate X and XI.

### 4.6.3 Wastes Disposal

On how the wastes are transported to their final destination, most respondents indicated that this is done through enclosed compaction vehicle. Table 4.6.6 presents the means of transporting wastes to final disposal site.

**Table 4.6.6: Means of transporting wastes to the final disposal site**

| **Transport of wastes to the final disposal site** | **Frequency** | | | **Percentage** |
|---|---|---|---|---|
| | **M** | **F** | **T** | |
| Open vehicle | 22 | 53 | 75 | 26.0 |
| Enclosed compaction vehicle | 76 | 96 | 172 | 59.0 |
| Others specify | 5 | 6 | 11 | 4.0 |
| No response | 12 | 32 | 32 | 11.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

The finding on Table 4.6.6 reveals that majority 172 (59%) of the respondents indicated that wastes are transported to the final disposal site with enclosed compaction vehicle while 75 (26%) of the respondents indicated that wastes are transported with open vehicle. This further reveals that the female gender had more knowledge on the transportation of wastes. In reality the vehicle use for wastes transport is a compacted vehicle but the compacted parts are broken away living the vehicle open, this could be the reason why few attested that it is an open vehicle. Photographs were taking in the course of observation.



**Plate XII: Transportation of wastes to final disposal site in ABUTH Shika-Zaria**



**Plate XIII: Compacted wastes disposal vehicle disposing wastes at final disposal site in ABUTH Shika-Zaria**

Observation revealed that ABUTH Zaria had only one functional compacted vehicle for transporting wastes to the final disposal, the compacted parts had broken away, living the vehicle almost open and which is dangerous to the health of workers.

Respondents were further asked on the methods for final disposal of wastes. Table 4.6.7 presents the methods of final disposal of wastes in ABUTH Shika-Zaria.

**Table 4.6.7: Methods for final disposal of wastes**

| Method of final wastes disposal | Frequency | | | Percentage |
|---|---|---|---|---|
| | M | F | T | |
| Landfill | 48 | 60 | 108 | 37.0 |
| Shredded plus other technologies | 2 | 25 | 27 | 10.0 |
| Open burning method | 58 | 65 | 123 | 42.0 |
| Combustion method | 3 | 12 | 15 | 5.0 |
| No response | 4 | 13 | 17 | 6.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

From Table 4.6.7 the finding reveals that the most common methods of final disposal of wastes are by open burning and landfill. The majority of the respondents 123 (42%) attest that open burning method is used for the final disposal of wastes, while 108 (37%) indicated landfill. The implication of open burning is that, it is hazardous to human and the environment. The combustion method is different from open burning in the sense that wastes are burnt at high temperature so as to convert them to residue or gaseous product and reduces the stress on landfill. Observation reveals that, there is a trench dug for landfill but not utilized.

This point is corroborated by a male key informant who is a waste collector with the Public Health Unit. In his words:

> One, we have open burning method; we have combusting method and rest of it. Since wastes are already generated from the wards, there are some people they can remove it from the wards to the final disposal. Even if, they carry it to final disposal, they suppose to handle it well in order to prevent it to spreading of the disease to the public. One either to combust to reduce the harm it could cause both to man and the environment, or rest of that. We have some sanitary landfill which can take care of it. But in this hospital I think is only one method that we are using is open burning method because they have trench. If we carry it to that trench, our last method is to burn.

Another male key informant who is a waste collector with the Public Health Unit, said:

> Ah, our last method is open burning. But it not suppose to be so, we have the landfill where the wastes suppose be buried but our truck cannot get to the place

> because the heap of sand is blocking it. So we pour it on the ground and burning it openly.

An observation was made to the site of the final method of wastes disposal and a picture is presented below.



**Plate XIV: Abandoned landfill in ABUTH Shika-Zaria**



**Plate XV: Burnt wastes in ABUTH Shika-Zaria**

A further inquiry was made to find out whether there are scavengers at the final wastes disposal site and 86 (30%) of the respondents indicated yes, 38 (13%) of the respondents indicated no, while 142 (49%) of the respondents indicated they did not know. This implies that majority of the respondents have no knowledge of scavengers coming to pick up medical wastes from the disposal sites.

However, an interview with waste manager reveals the presence of scavengers at the final disposal sites. According to him:

> Yah, there are, but sometimes we use to send them away from picking wastes. Some of them are from the nearby villages. You see them picking needles, bottles, rubbers and so many things to go and sell. We have tried our best but they would not stop coming.

An observation was made to the final disposal site, and it was found out that scavengers come to pick medical wastes and others wastes for sales.




**Plate XVI: Scavengers at the final wastes disposal site in ABUTH Shika-Zaria**

### 4.6.4 Problems faced with facilities in managing wastes in ABUTH Shika-Zaria

On response to whether the management has problem with facilities currently being used in healthcare waste practice, 116 (40%) of the respondents indicated that there are problems with wastes management facilities, 70 (24%) of the respondents indicated no, while 86 (30%) of the respondents did not know. For respondents who were ignorant of the problems of waste management facilities, it could be they are not involved in any way in the manner in which wastes are managed. Further inquiry was made to identify what kind of problems they are faced with. Table 4.6.8 presented responses on different kinds of problem faced on waste management.

**Table 4.6.8: Types of problems associated with facilities**

| **Problems with facilities in use** | **Frequency** | | | **Percentage (%)** |
|---|---|---|---|---|
| | **M** | **F** | **T** | |
| Infection, diseases and physical injury | 32 | 29 | 61 | 21.0 |
| Lack of modern equipments | 35 | 62 | 97 | 33.0 |
| Shortage of waste collectors and waste management staff/personnel | 18 | 58 | 76 | 26.0 |
| Lack of Finance | 13 | 13 | 26 | 9.0 |
| No response | 17 | 13 | 30 | 10.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.6.8 reveals that most of the respondents which constitute 97 (33%) identified lack of modern equipment as a major challenge, and to a lesser extent lack of finance pose a challenge and this could be the reason why modern equipment for waste management could not be purchased, shortage of waste collectors and waste management staff is due to low income in salary and so very few are employed for the job.

One of the male waste collectors captured the state of facilities aptly when he said:

> Eh en, our facilities are old especially our truck. It develops problems sometimes, we only have one truck for disposing waste, can you imagine. I think lack of finance contribute to this, even my salary is less than N35,000, is not worth it. Also talk of personal protective equipment, we are in short of boots, few hand gloves, even self our hand gloves are not thick enough only few of them are thick. Face mask is that normal one is not thick also. Because of this some of us have inhale bad odour that make us sick and most times is needle pricking and are infected with one sickness or the other.

Another male key informant who is a waste collector had this to say:

> There are problem with facilities but ABUTH is trying, the only thing is that, it is not satisfactory. Sometimes ago they made provision for big plastic rubbers that can contain enough wastes. The only problem is that the wastes are mixed up in them. But at least it has prevented us from needle pricking. But they need to provide more facilities especially Personal Protective Equipment (PPE) to protect ourselves.

## 4.7 Safety Measures put in Place for Healthcare Workers

This section being the last section presents safety measures suggested by both the respondents and the key informants in order to properly manage wastes generated in the hospital. In this section, workers were asked on their awareness of programmes on healthcare waste management. About 131 (45%) of the respondents who were majority of the workers indicated that they are aware of some programmes on wastes management. A further inquiry on what programme they knew of shows that there had

been sensitization programme in form of seminars, workshops and public health talks. See Table 4.7.1 for details.

**Table 4.7.1: Examples of programme on waste management**

| **Programme on waste management** | **Frequency** | | | **Percentage (%)** |
|---|---|---|---|---|
| | M | F | **Total** | |
| Seminar/sensitization programme | 36 | 47 | 83 | 27.0 |
| Workshops | 28 | 27 | 55 | 19.0 |
| Public health talk | 21 | 24 | 45 | 17.0 |
| No response | 30 | 77 | 107 | 37.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.7.1 reveals that 83 (27%) of the respondents are aware of seminars/sensitization programmes in the hospital, 55 (19%) of the respondents are aware of workshop, while 45 (17%) of the respondents are aware of public health talk as a waste management programme. Both genders knew of one programme or the other as shown from the gender distribution above.

Respondents were further asked if the hospital conducts any training for workers on healthcare waste management. About 124 (43%) of the respondents indicated that the hospital conduct training on waste management, 75 (26%) of the respondents indicated no, while 59 (20%) of the respondents did not know. Respondents were further asked if they had benefited from any training on healthcare waste management. It was revealed that only 104 (36%) of the respondents had undergone such training. In order to identify what programmes they had attended in the course of their training, a question was asked on what type of training have they received. Respondents were specifically asked about the kind of training they received on waste management. See Table 4.7.2 for details.

**Table 4.7.2: Type of Training Receive by Workers on Waste Management**

| Type of training received | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| | M | F | T | |
| Short term course | 19 | 20 | 39 | 13.0 |
| Workshops | 26 | 21 | 47 | 16.0 |
| Seminars | 30 | 51 | 81 | 28.0 |
| No response | 40 | 83 | 123 | 43.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.7.2 reveals that 81 (28%) of the respondents had attended seminars on waste management, with the female gender more represented. Slightly more males had attended workshops but almost the same number of males and females had benefited from short-term course. In some cases, individuals had been opportune to have attended up to two of the programmes.

In response to the above question a further inquiry was made to find out how many times they have been exposed to training/seminars on healthcare waste management which is presented in Table 4.7.3.

**Table 4.7.3: Number of times Workers have been exposed to Training/Seminars**

| Type of training received | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| | M | F | **Total** | |
| Once | 45 | 67 | 112 | 38.0 |
| Twice | 17 | 19 | 36 | 12.0 |
| Three time | 15 | 7 | 22 | 8.0 |
| Over three times | 6 | 9 | 15 | 5.0 |
| None | 17 | 40 | 57 | 20.0 |
| No response | 15 | 33 | 48 | 17.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.7.3 reveal that majority 112 (38%) of the respondents indicated that they have attended the training on healthcare waste management once. Many have had multiple opportunities of attending training/seminars, some as many as over three times. This

implies that majority of the hospital workers have attended training at least once on healthcare waste management.

Table 4.7.4 presents on the types of precaution hospital worker are trained to take while handling waste products.

**Table 4.7.4: Types of precautionary measures used by workers**

| Type of precautions used by workers | Frequency | | | Percentage (%) |
|---|---|---|---|---|
| | M | F | **Total** | |
| Use gloves | 26 | 31 | 57 | 20.0 |
| Protective gown | 8 | 6 | 14 | 5.0 |
| Mask/glasses | 2 | 1 | 3 | 1.0 |
| Boots | 1 | 1 | 2 | 1.0 |
| None of the above | 1 | 1 | 2 | 1.0 |
| All of the above | 52 | 83 | 135 | 47.0 |
| No response | 25 | 52 | 77 | 25.0 |
| **Total** | | | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.7.4 reveals that majority 135 (47%) of the respondents are trained on all precautionary measures – including the use of gloves, protective gown, boots and masks. This implies that all of the above precautions are taken when handling wastes products.

An interview with a male key informant who is a doctor had this to say:

> As a surgeon, it is mandatory to take precaution by protecting yourself as much as possible from being infected. Most of the time here in the surgery room I put on my PPE always because of the nature of our work in this operating theatre.

Given the risk of infectious diseases, hospital workers were asked if they are given hepatitis and tetanus vaccinations. Most of the respondents 154 (53%) indicated that they had received hepatitis and tetanus vaccination to protect them against being infected in case of any accidents in the course of handling wastes and healthcare delivery. The remaining 103 (36%) of the respondents indicated that they had not

receive vaccination. In order to understand the reason why some did not receive the vaccination, see Table 4.7.5 for details.

**Table 4.7.5: Reason for not taking hepatitis and tetanus vaccination**

| Reason for not taking vaccination | Frequency | Percentage (%) |
|---|---|---|
| Don't know | 37 | 12.0 |
| Reluctant to go and be vaccinated | 81 | 28.0 |
| Not free, we pay | 38 | 13.0 |
| Self administered | 20 | 7.0 |
| Not available | 31 | 11.0 |
| No response | 83 | 29.0 |
| **Total** | **290** | **100.0** |

***Source:*** *Field Survey, 2016.*

Table 4.7.5 shows that majority 81 (28%) of the respondents demonstrated a nonchalant attitudes towards vaccination as means of precaution against infection. The reason could be that the vaccination is not free as indicated by 38 (13%) of the respondents. The remaining 37 (12%) did not as they claimed they did not know. While a few 20 (7%) of the respondents was self administered as they understand the implications of not being vaccinated against infection.

### 4.7.1 Respondents views on ways to improve wastes management in ABUTH, Zaria

Respondents suggested measures to improve the situation of hospital waste management. 97 (34%) of the respondents stated that the hospital authority should provide containers with cover and label with different biohazards symbols, as this will prevent pollution within the hospital premises and reduce the mixtures of wastes in one bin. They further suggested that more waste collectors be employ and embarking on seminars/workshop to update their workers on current trends regarding hospital waste management and to try all their possible best to stop scavenger at the final waste

disposal site for this will go a long way to protect the public against infections from medical wastes.

On suggestions made to the staff of the hospital, 114 (39%) of the respondents stated that the hospital staff should imbibe positive attitudes towards waste management by segregating wastes from the source of generation into different colour coding containers. Incidents of occupational hazard should immediately be reported to the appropriate authority and also encourage staff to put on their personal protective equipment in the course of healthcare delivery.

Suggestions were also made to the government, 79 (27%) of the respondents suggested that government should provide adequate fund for hospital wastes management and also employ more trained staff on healthcare waste management. Government should create sufficient awareness about the dangers of healthcare wastes to the general public and should make every effort to supervise how the hospital wastes management is being managed from cradle to grave and also to enforce policy on waste management. They should create room or send staff for international conferences and training to develop their acumen on waste management.

### 4.8 Summary of Waste Management Practices in the Hospital

In order to assess the ABUTH Zaria wastes management objectively and to know if they are sustainable, the approach outlined in the guidelines suggested by Townend and Cheeseman (2005) was used. This guideline is presented in a simple table format that link performance with a set of criteria to assess the level of sustainable development associated with the healthcare facility in ABUTH Zaria. See Table 4.8.1.

**Table 4.8.1: Summary Result of the application of the Townend and Cheeseman Guidelines for the Sustainable Management of Hospital Waste at the ABUTH, Zaria**

| Healthcare Waste Management Criteria | Description of Existing Practice in ABUTH, Zaria | Corresponding Sustainable Level of HW Management at Study Site |
|---|---|---|
| **General Management Strategy** | | **2** |
| Hospital waste management policy or strategy | No existing Hospital waste management policy. | |
| Special budget for waste management | There is special budget. | |
| Operative staff for management of waste | Public Health Unit and three other private companies. | |
| Training on waste management | No records of special training for handlers of healthcare waste. Although some staff had received training on waste management. | |
| Personal Protective Equipment worn by operative staff | Personal Protective Equipment is limited | |
| **Waste Collection and Segregation** | | **1** |
| Type of receptacles/storage containers (uniform or specific, varying types, sizes etc) | Varying types and sizes of none specified waste containers are available. | |
| Color coding of receptacles | There is color coding without symbols | |
| Number/adequacy of waste receptacles | They are big plastic rubber bin with cover and tyres but few in numbers alongside with small containers. | |
| Are sharps and infectious materials collected separately | Yes, sharps i.e. needles only are collected in sharp boxes while other infectious materials are mixed up with other wastes. | |
| Is segregation regulated or controlled | Only sharps are segregated and controlled | |
| **Waste Recycling** | | **2** |
| Is there any form of recycling? | No form of recycling | |
| What is recycled? | Nothing | |
| Are syringes reused? | No | |
| What else is re-used? | Bed linings and theater equipment after sterilization. | |
| **Waste Storage** | | **2** |
| Is there a purpose built waste treatment facility? | Yes, but the incinerator is not functioning. The sewage treatment is functioning. | |
| Are wastes dumped outside the hospital building? | Wastes are dump far away from the hospital building but still within the hospital premises. | |
| Open waste disposal? | Yes, wastes are supposed to be dumped in a large pit outside the hospital building but it is not in use. | |
| **Waste Treatment** | | **2** |
| Autoclaving of lab wastes | Autoclaving of theatre materials | |
| Crude incineration outside | Yes, the incineration plant is not working | |
| Encapsulation example, of sharps | Yes | |
| Waste burial within healthcare facility | Yes, there is but not utilized | |
| Chemical disinfection of body fluids | Yes | |
| Other advanced technology | None | |
| **Offsite disposal** | | **2** |
| Waste disposal contracted out? | No, but have hired companies cleaning the environment. Public Health Unit is in charge of waste disposal. | |
| How waste is transported (open vehicle? Enclosed compaction vehicle? | Wastes are collected in colored bags and transported in enclosed compacted vehicle. | |
| What is the final destination of the waste (open dump, level 1 landfill, hazardous waste engineered landfill, shredded + some other technology? | Sharps are dumped in the incinerator plant and locked up. While other wastes are burnt openly at the disposal site. Absence of security personal. | |

Adopted from Abah & Ohimain (2011)

From Table 4.8.1, on General Management Strategy, the hospital management is operating in a manner with some aspects that are considered sustainable and others that are considered unsustainable. The unsustainable aspects include absence of a hospital waste management policy, lack of record of special training for waste handlers and limited protective equipment even though there is a special budgets for waste management.

Regarding waste collection and segregation, this aspect is generally operating in an unsustainable manner, although there is some evidence of awareness and willingness to change. It is observed that color coding is used without any biohazard symbols and only needles are effectively segregated into safety sharp boxes with biohazard symbol but most of the other wastes and sharps are mixed up. The combination of pointed objects (sharps) and other items in polythene bags is hazardous to those handling the wastes. The risk of infections cannot be overemphasized. Perhaps, the workers need some orientation and enlightenment on the significance of proper segregation of various categories of waste and color coding, this is the reason why it is stated that there is willingness to change.

On waste recycling, it is not a bad practice rather it is a way of minimizing waste, yet it is observed that nothing is recycled. However it is credible not to reuse sharps and to sterilize any other instrument to be reused. It is based on this that it is concluded that the hospital is operating in a manner with some aspects that are considered sustainable and others that are considered unsustainable.

Regarding waste storage, the hospital is operating also in a manner with some aspects that are considered sustainable and others that are considered unsustainable. For example, the sewage storage is effective because it is transported through pipes to the

tank at treatment plant, but the solid waste is observed to be stored in open places within the hospital vicinity and in the front of the wards with containers that are left open and sometimes left to overflow causing sight sore and unbearable odor to visitors, hospital workers and patients.

On waste treatment, the waste treatment operating performance is generally operating in accordance with sustainable and unsustainable development while the sewage treatment is functional, some aspects of other treatments are not ideal. For instance, incineration is meant to incinerate sharps to zero harmful level before burying the ashes but this is not done rather; all wastes are mixed and burnt openly.

The offsite disposal of waste is operating in accordance with sustainable development, but some aspects are not ideal, despite the fact that there is a site for landfill and incinerator for burying wastes and incinerating sharps respectively before final wastes disposal, both were not in use as at the time of this study. The method resorted to is open burning which is harmful to animal, human and the environment. There is also absence of security personnel as observed by the researcher. This gives room for scavengers; (see Plate XIV) such scenario is not ideal to the recommended practice and can be inimical to the health of the scavengers and their communities.

### 4.9 Discussion of Major Findings

The study found out that two major types of wastes are generated which include municipal solid wastes which are non infectious wastes (such as food remains, bedding materials, papers, polyethylene bags etc) and special healthcare wastes which are infectious wastes (sharps, expired drugs, used x-rays film, swabs, nappies, blood bags etc). This finding is in line with Johannessen, *et. al.*, (2000) who categorized healthcare wastes into two broad categories: municipal solid waste and special healthcare waste.

Adaptation as one of the functional schemes of the theory explains this objective. This is because human activities take place in an environment and this generates wastes and it is therefore left for the actors to control the wastes in such a way that it will give room for adaptable and conducive environment both for the hospital workers, patients and the general public.

The study found out the attitude of workers towards hospital waste management in ABUTH, Zaria. From the findings, it was reported that 138(47%) of the workers disagreed that workers attitude towards hospital waste management is not satisfactory, this is in congruence with the finding of Manyele (2003) who assessed the attitudes of workers on hospital waste management in Tanzania and found negative attitudes on issues related to hospital wastes management which was generally lacking among generators and handlers of hospital waste. It was also reported that 184(64%) agreed that hospital workers segregate wastes at the source where they are generated and mainly sharps (needles). This attitude of waste segregation reveals a positive attitude towards waste management. This is in line with a study carried out in India by Sachan *et. al.* (2014) who reported a desirable attitude of hospital workers on segregation of wastes. Integration as the third functional scheme of the theory explains this objective on workers' attitude towards hospital waste management. Where there is no adequate socialization of workers (i.e. education, training, knowledge and practice) on the basic culture (i.e. values and norms) of the hospital waste management such as segregating hospital wastes at the point of generation into different categories and dumping them into their different colour coded bins or plastic bags with their specific symbols, then there is bound to be a negative attitude towards hospital waste management and vice versa.

The study examined the effects of hospital wastes on workers in ABUTH Zaria. A section reveals types if injury incurred in the course of wastes disposal and healthcare delivery by workers and it was found out that 104 (36%) of the hospital workers had had needle piercing injury as occupational hazard. This agrees with Talaat (2003), who reported high frequency of needle stick injury among healthcare workers in Egypt. This is also consistent with Pruss-Ustin, (2005) who reported an estimated of 2 million healthcare workers with needle stick piercing injury each year that had resulted in an approximately 16,000 hepatitis C virus (HCV) and 66,000 hepatitis B virus (HBV) among healthcare workers. Also, it was found out that majority of the hospital workers which constitute 148 (51%) do not report any form of occupational hazard to the appropriate authority in ABUTH Zaria. This is in contrast with report made by WHO (2004) on 136 American healthcares workers out of 191 who reported cases of occupational hazard to the Centre for Disease Control and Prevention (CDCP). A cross tabulation of professions by type of injury sustained was done and it was found out that 91(56%) of nurses sustained more injuries followed by 41(26%) of doctors. This is in agreement with Azuike, *et al,* (2015) who reported that 76% of the nurses and 64% of the doctors sustained one injury or the other respectively in the course of healthcare delivery. Latent and manifest function as the fourth functional schemes of the theory explain this objective in that treatments have unintended consequences in the process of treating patients and collection of hospital wastes by the wastes collectors and cleaners, they could be at risk as a result of been exposed to diseases and sharps that are not properly disposed thereby they could be infected.

The study assessed the challenges faced by hospital management in managing hospital wastes in ABUTH Zaria. The result shows that wastes are collected in bins within the hospital. These bins contain colored polyethylene bags to indicate waste categorization

but no actual segregation was observed, except for sharps which are kept in a special safety boxes. This agrees with Abah & Ohimain (2010) who found out that sharp waste segregation were done in the wards and no other form of waste segregation occurs at any level, and no strategy is in place for waste minimization.

On waste treatment practices obtainable in the hospital, autoclave, incineration, chemical disinfection, waste burial and encapsulation of waste, the treatment of sewage were observed and found to be effective. However, it was observed that both landfill and incineration which were supposed to be the major wastes treatment in ABUTH Zaria were not functioning as they should. The incinerator at the time of study was not functioning and the vehicles could not get to the trench where the wastes are supposed to be deposited thus, resulting in wastes being dumped in the open at the entrance of the trench, where all these sorts of wastes are burnt. This is in line with the scenario reported by Taghipour *et al.* (2009) who making reference to Iran, said that medical wastes are still handled and disposed off together with domestic wastes in most cities with a poorly designed landfill and incinerator for the treatment of wastes which pose operational and maintenance problems. To understand workers' perception on their level of satisfaction with waste management in ABUTH Zaria, the findings revealed that very few people are very satisfied with waste management as indicated by 45 (16%). The majority 138 (47%) of the workers indicated they were only somewhat satisfactory while 96 (33%) were not impressed. Goal attainment as the second functional schemes explains this objective. The primary goal of the hospital is to take care of patients. And for the hospital to function and attain this goal, the hospital management board must meet the needs of the hospital workers in general in terms of salary, security, social welfare and healthcare scheme among others. This is to motivate all the workers in various units/departments to play their different roles, thereby leading

to the hospital goal attainment of healthcare services. In situation where one of the motivating factors is lacking, there is bound to be dysfunction in the subsystem (health) and in the entire system (society) thereby defeating the hospital primary goal.

The study finds out safety measures put in place to improve the situation of hospital wastes management on workers in ABUTH Zaria. A section on interview reveals that personal protective equipment is worn by healthcare workers but they are not enough to meet the need of the workers. Observation shows that the use of hand gloves and eyes goggles is not consistent among workers in the hospital. This is in agreement with Ogbona, *et al*, (2012) who found that in large hospitals in Nigeria safety measures like eye goggles are not always observed and used among the worker. This is also in line with Joshua, *et al.,* (2014) who conducted a study among primary healthcare workers in Zaria and found inconsistency in the use of hand gloves and other safety measures among workers. Also, latent and manifest function as the fourth functional schemes of the theory explain this objective in that the manifest functions are the intended functions to heal, and to provide health drugs and equipment for use. The management in their entire effort must see that they put in place measures to safeguard the health of worker and see that all the basic healthcare facilities for waste management are provided and that they are in good condition, for this will enhance the work of the healthcare workers, waste collectors and cleaner in the hospital for proper hospital waste management.

Several suggestions were made on how to improve hospital waste management to the hospital authority, staff and the government. Most important is the staff who are the generators of waste. Suggestion was made on proper segregation of wastes into different categories of colour coding with different biohazard symbols. Putting on of personal protective equipment is of most important to the workers in the course of

healthcare delivery and to report any occupational hazard to the appropriate authority immediately.

The functionalist theory that was adopted for this study, viewed the hospital as an organism with various parts which are interdependent and interrelated. This different part performs various functions towards the maintenance, stability and survival of the system. The theorizing of Talcott Parsons along its four functional imperatives for all action system, that is, is famous AGIL scheme was used to explain the impact of wastes management on workers in ABUTH, Zaria. Adaptation as the first scheme implies that the hospital must adapt to its environment as workers in each unit plays their roles effectively. Goal as the second scheme implies that the hospital primary goal is to take care of patients. Integration as the third scheme implies that for social equilibrium to take place for proper management of healthcare wastes and for the safety of patients and general public, the workers must be trained into the norms and values of waste management through workshops and seminars. The forth scheme which is the pattern maintenance include the latent and manifest function. The manifest functions are the intended functions and this is to make heal and to provide health drugs and equipment for use in the hospital. The latent or unintended function however is that treatments have unintended consequences in the process of treating patients and in collection of hospital waste.

Where any of these schemes malfunctions, there is bound to be imbalance in the system thereby threaten the sub-system (health) and by extension, the entire system (society).

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents the summary of key findings, conclusion and recommendations drawn from the findings of the study.

## 5.2 Summary of Key Findings

This study is on assessment of hospital wastes management in ABUTH Zaria, Kaduna State, Nigeria. The finding reveals that hospital waste management is one of the major concerns and challenges faced by ABUTH, Zaria. The findings revealed that there are two major types of wastes generated in the hospital include, both infectious and noninfectious wastes, which can be in both solid and liquid forms but of most concern is the infectious wastes. With regard to the attitude of workers towards wastes management in ABUTH Zaria, it was found out that attitude of hospital workers towards waste management is not satisfactory as only sharps are segregated into safety sharp boxes while others wastes are mixed up, even though there are color coded bags.

Findings on the challenges of hospital waste management in ABUTH Zaria includes nonchalant and filthy attitudes of hospital workers and visitors respectively, improper utilization of the waste disposal facilities, lack of waste storage facility, inadequate cleaners (manpower), lack of waste categorization (segregation) high cost of managing this waste, inadequate equipment, lack of functional incinerator, non compliance with simple hygiene practice, none compliance with the coding system, allowing waste bin to overflow, lack of education of cleaners or inadequate training of workers, improper location of waste bins, inadequate safety devices and lack of proper monitoring among others. It was also discovered that cultural setting of a hospital plays a vital role in the

sustainability of hygienic practices in its environment. There is generally a poor culture of hygiene which is reflected in the people visiting the hospital. The study examines the effect of hospital wastes on workers in ABUTH Zaria and found out that fever and allergic skin infections are the major implications of improper waste management on workers and waste handlers. It was revealed that hospital workers are prone to injury majorly from needle piercing and other occupational hazard. Among professionals, nurses and the doctors are mostly affected respectively. In regards to the health care of workers, it is unfortunate that little is done to compensate anyone injured or who falls sick, as confirmed from one of the key informant who said that there is no compensation but that they pay for their treatment through NHIS and that the treatment is not free.

Lastly, the study found out the safety measures put in place to improve the situations of hospital waste management on workers in Ahmadu Bello University Teaching Hospital, Zaria, include the use of personal protective equipment but these are in limited supply. There is inconsistency of workers in the use of hand gloves and eye goggles for protection. Measures for improvement were suggested to the hospital authority, staff and the government respectively.

## 5.3 Conclusion

The findings in this study demonstrated that the waste management practice in ABUTH Zaria did not meet international best practices. Waste management with safe and environmentally sound methods cannot be over-emphasized, therefore to conclude, the hospital management board and the hospital workers need to imbibe the culture of good and proper waste management practice that will prevent staff, patients and the general public from the attendant threats of poor waste management practices. In order to

execute standard waste management, ABUTH Zaria should put more effort to provide the hospital workers with enough personal protective equipment, workers should report any accident of occupational hazard to the appropriate authority and positive attitudes towards proper segregation of all wastes into different waste categories should be imbibe. The waste management team constituted by ABUTH management should take the bull by the horn to prepare waste management plan, policy documents and technical guidelines and in addition supervise waste management activities. There should be intensive training and retraining of workers and waste handlers on effective waste management activities. Furthermore, the required waste management facilities such as the right containers, incinerators, landfills, waste disposal vehicles and a recycling plant as well as the technologies such as irradiation, encapsulation and chemical disinfection should be installed. However, in order to reduce the cost of waste management, the hospital can collaborate to have central facilities and make appropriate budget that will cover all waste management cost in the hospital.

## 5.4 Recommendations

The following recommendations are made based on the findings:

1. The study found that there were no colour coded wastes bin with biohazard symbols and covers in the hospital as 34% of the respondents suggested that the hospital authority should make all effort to provide colour coded waste bins that have covers with different biohazard symbols for various categories of wastes. Based on this finding, the study recommends that the hospital authority should make all effort to provide waste bins that have covers with different colour and biohazard symbols for various categories of wastes. This will go a long way to reduce the risk of contracting diseases and pollution in the hospital environment.

2. Finding from the study revealed that there were few waste collectors and improper disposition of waste along with the incinerator plant which was not functioning as at the time of the study as 34% of the respondents suggested that the hospital authority should employ more hands in the collection and proper disposal of wastes and to see that the incinerator plant for incinerating sharp before final burial is working optimally. Based on this finding therefore, the study recommends that the hospital authority should employ more hands in the collection and proper disposal of wastes and also to see that the incinerator plant for incinerating sharp before final burial is functioning optimally.
3. The study found that the majority of the hospital workers are without personal protective equipment as 34% of the respondents suggested that quality personal protective equipment should be provided for the workers. Based on this finding, the study recommends that the hospital authority should provide adequate and quality personal protective equipment to all wastes collectors and healthcare worker in the hospital as this will protect them against any infection in the course of healthcare delivery.
4. The study found that there were no securities at the wastes disposal site as at the time of study and scavengers come from the neighboring village to pick up medical wastes, as 34% of the respondents suggested that the hospital authority should make all effort to provide security men to stop scavengers from the waste disposal site. Based on this finding, the study recommends that the hospital authority should make all effort to stop scavengers from scavenging medical wastes from the final waste disposal site by deploying security guards close to the site. This will prevent the reselling of infectious wastes to the general public.

5. Findings from the study revealed that 39% of the respondents suggested that staff should develop positive attitudes to segregate wastes into different color coded wastes bags, put on their personal protective equipment when on duty and also to imbibe the culture of reporting any incidence of occupational hazard to the appropriate authority. Based on this finding, the study recommends that staff of the hospital on their part should develop positive attitudes in the segregation of wastes into different color coded wastes bags for proper identification from point of generation and that the staff should imbibe the culture of putting on their personal protective equipment always when on duty or in the course of healthcare delivery and disposal of wastes. The hospital workers should imbibe the culture of reporting any incidence of occupational hazard to the appropriate authority and prompt action should be taken to treat waste workers who sustain injuries or fall ill in the course of their duties.
6. The study found out that 27% of the respondents suggested that government should enforced policy on hospital waste management in line with recommended international best practices. Based on this finding, the study recommended that the government should ensure that there is a policy on hospital waste management in line with recommended international best practices which should be monitored and enforced. The government should create programmes that would develop the hospital waste management workers at all level of healthcare institutions. This could be by sending them for international conference on waste management in order to have adequate knowledge on the WHO recommended practices.

## 5.5 Study Contributions to Knowledge

The study contributes to knowledge as follows:

1. Ahmadu Bello University Teaching Hospital, Shika-Zaria as reputable as it is, is not able to measure up with the international best practices as recommended by World Health Organization (1999) as revealed from the findings in the study.
2. There is no policy on ground guiding the proper tracking of waste management from cradle to grave in Ahmadu Bello University Teaching Hospital, Shika-Zaria as revealed from the findings in the study.

## REFERENCES


Abah, S.O. and Ohimain, E.I. (2010). Assessment of Dumpsite Rehabilitation Potential using the Integrated Risk Based Approach: A case Study of Eneka, Nigeria. *World Applied Science Journal*, 8(4): 436-442.

Adegbita, M.A., Nwafor, S.O., Afon, A., Abegunde, A.A. and Bamise, C.T. (2010). Assessment of Dental Waste Management in a Nigerian Tertiary Hospital. *Journal of Waste Management Resource*, 28: 769-777.

Adesida, A.A. and Igbuku, A.O. (1988). Solid Waste Management. Shell Petroleum Development Company (SPDC) Approach in London M.D.B.

Afon, A.O., (2005). Solid Waste Management in Selected Cities of Oyo State, Nigeria. Unpublished Ph.D. Thesis, Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria.

Akter, N. (2005). *Medical Waste Management: A Review. Environmental Engineering Program*, School of Environment, Resource and Development and Asian Institute of Technology, Thailand.

Alagoz, B.A.Z. and Kocasoy, G. (2007). Treatment and Disposal Alternatives for Health-care Wastes in Developing Countries – A Case Study in Istanbul, Turkey. *Journal of Waste Management Resource*, 25: 83-89.

Alamu, J.F. and Olukosi, J.O. (2010). Simplified Research Methodology: Principle and Practice. Revised Edition. Zaria, Great Glory Publisher.

Al-Khatib, I.A. (2006). Occupational Safety of Cleaning Personnel in Palestinian District Hospitals. *Eastern Mediterranean Health Journal*. 12: 637-652.

Alork, S., Varsha, S., Swati, S. and Prabhab, S. (2013). Awareness of Biomedical Waste Management Among Health Care Personnel in Jaipur, India. 12(1). 78-89.

Askarian M, Vakili M, and Kabir, G. (2004). Results of a Hospital Waste Survey in Private Hospitals in Fars Province, Iran. Waste Manage. 24(4): 347-352.

ATSDR (Agency for Toxic Substances and Disease Registry) (1990). *The public health implications of medical waste: a report to congress*. Atlanta, Georgia, US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry.

Azuike, E.C., Adinma, E.D., Nwabueze, S.A., Azuike, E.D., Mbanuzuru, V.A., Epundu, U.U. Enwonwu, K.G., Chikezie, N.I., Ajator, C.C., Onebunne, E.M. and Obi, D.C. (2015). Healthcare Waste Management: What do the Health Workers in a Nigerian Tertiary Hospital Know and Practice? *Science Journal of Public Health. Vol. 3, No. 1, 2015, pp. 114-118. doi: 10.11648/j.sjph.20150301.30.* http://www.sciencepublishinggroup.com/j/sjph. Accessed on 11/12/2015.

Babatola, J.O. (2008), A Study of Hospital Generation and Management Practice in Akure, Nigeria. African Research Review; *An International Multidisciplinary Journal* Ethiopia 2(3).

Babbie, E. (2001). The Practice of Social Research, 9th Edition. Belmont, Wadsworth/Thomson Learning, USA.

Basel Declaration of Environmentally Sound Management of wastes (1999). United Nations Environment Programme, Geneva Switzerland. Available online at: http://www.basel.int/meetings/cop/cop5/ministerfinal.pdf. Accessed on 26/08/2015.

Beltrami, E.M. (2000). Risk and management of blood-borne infections in health care workers. *Clinical Microbiology Reviews*, 13(3), 385–407.

Blackman, W.C. (2006). Basic Hazardous Waste Management, 2nd Edition, Lewis Publishers, Inc., Michigan.

Blenkharn, J.I. (2006). Standards of Clinical Waste Management in UK Hospitals. *Journal Hospital Infection.* 62(3): 300-303.

Cagno, E., A.D. Giuilio and P. Trucco, (1999). A Methodological Framework for the Initial Environment Review (IER) in EMS implementation. *Journal of Environmental Assessment and Policy Management*. 1(4): 505-532.

Chartier, Y., Emmanuel, J., Pieper, U., Prüss, A., Rushbrook, P., Stringer, R., Townend, W., Wilburn, S. and Zghondi, R. (2014). 2nd Edition: World Health Organization. Safe Management of Wastes from Health-care Activities.

Chul-Jang, Y., Lee, C, Yoom, O. and Kim, H. (2006). Medical Waste Management in Korea. *Journal of Environmental Management.* 80(2), 107 – 115.

Coker, A.O. Sangodoxin, A.Y. and Ogunlowo, O.O (2008). Managing Hospitals Waste in Nigeria. Proceedings of the 24th Annual Conference of Water, Engineering and Development Centre Islamabad Pakistan, 70-72.

Coker, A.O., Sikiru, K.A., Sridhar, M.K.C. and Sangodoyin, A.Y. (1999). Characterization and Management of Solid Hospital Wastes in Ibadan, Nigeria. In Integrated Development for Water Supply and Sanitation: Proceedings of the 25th Annual Conference of Water, Engineering and Development Centre, (WEDC), Edited by John Pickford, UK, November, 1999 Addis Ababa, Ethiopia, pp. 331-334.

Colorado Department of Public Health and Environment Compliance Bulletin, Household, (2006). Medical Waste Management.

Daily Trust Newspapers of 17th September, 2008.

Eddiefloyd, M.I. (2003). Basic Sociology. Enugu. CIDJAP Press Publication Uwani, Nigeria. pp. 333.

Engineer, A. D., (2009). Angola's National Healthcare Waste Management Plan.

Ernest, B. (1921). *Old World Traits Transplanted: The Early Sociology of Culture* with Herbert A Miller, & Kenneth Thompson, New York: Harper & Brothers. http://www.humanecology_en.pdf Accessed on 27/09/2014.

Farzadika, M., Moradi, A. and Mohammdi, M.S. (2009): Hospital Waste Management Status in Iran: A Case Study in the Teaching Hospitals of Iran University of Medical Sciences. *Waste Management Resource.* 27: 384 – 389.

Federal Environmental Protection Agency (FEPA) (1991). Guidelines for the Management of Solid and Hazardous Wastes in Guidelines and Standards for Environmental Pollution Control in Nigeria.

Ferraz, A. and Afonso, S.A.V. (2003), Incineration of Different Types of Medical Wastes: Emission Factors for Gaseous Emissions, Atmospheric Environment. 37, 5415 – 5422.

George, R. and Jeffery, S. (2014). *Sociological Theory:* 9th Edition, USA. McGraw Hill Education.

Hardoy, J. (1992). Environmental Problems in Third World Cities, London: Earth scan Publications.

Hauri, A.M., Armstrong, G.L. and Hutin, Y.J. (2004). The global burden of disease attributable to contaminated injections given in health care settings. *International Journal of STD and AIDS*, 15:7–16.

Hem-Chandra, (1999). Hospital Waste: An Environmental Hazard and its Management. *Environmental Journal*, 5(3). Pp. 57 – 89.

Hossain, M.S. (2011). Clinical Solid Waste Management Practices and Its Impact on Human Health and Environment—A Review. *Waste Management*, 31:754–766.

Jadhav, H.V. (1992): Elements of Environmental Chemistry. Bombay. Hilmaya Publishing House, Pp. 13.

Johannessen, L. M, Dijkman, M; Barlone, C; Henraham, D.; Boyer, M. G, Chandra, C (Eds). (2000). Health Care Waste Management Guidance Note. The World Bank. Urban Development Division, Infrastructure Group. Environment Department and Health, Nutrition and Population team. http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/Johannssen-HealthCare-whole.pdf. Assessed on 23/11/2015.

Joshua, I.A., Mohammed, S., Makama, J.G., Joshua, W.I., Audu, O., Nmadu, .A. G. and Ogboi, J. B. (2014). Hospital Waste Management as a Potential Hazard in Selected Primary Healthcare Centres in Zaria, Nigeria. *Nigerian Journal of Technology (NIJOTECH)* 33(2): 215 – 221.

Kaseva, M.E. and Mato, R.A.M. (1999). Critical Review of Industrial and Medical Waste Practices in Dares Salaam City. Waste Management. 25: 271 – 287.

Kgathi, D. I. and Bolance, B. (2001): Instruments for Sustainable Solid Waste Management in Botswana Waste Management Research, 19: 342 – 5.

Leonard, L. (2003). Healthcare Waste in Southern African. A Civil Society Perspective. Proceedings of the International Healthcare Waste Management Conference and Exhibition, Johannesburg, South Africa.

Longe, E.O. and Williams, A.A. (2012). A Preliminary Study of Medical Waste Management in Lagos Metropolis, Nigeria. *Iran Journal of Environmental Health Science*; 3 (2):133-139.

Mandal, S.K. and Dutta, J. (2009). Integrated Bio-medical Waste Management Plan for Patna City, *Institute of Town Planners, India Journal*, 6(2):1–25.

Manyele, S.V. (2004). Medical Waste Management in Tanzania: Current Situation and the Way Forward. *African Journal of Environmental Assessment Manage*. **8**(1): 74-99.

Manyele, S.V., Anicetus, H. and Bilia, M.H. (2003). Globalization and Its Effects on Medical Waste Management in Tanzania, IET General Conference and General Meeting, $4^{th}$-$5^{th}$ December, 2003, ARCC Arusha, Tanzania.

Masur, H., Emanuel, E. and Lane, H.C. (2003). Severe acute respiratory syndrome: providing care in the face of uncertainty. *Journal of the American Medical Association*, 289:2861–2863.

Mokuolu MO (2009). Improving the Management of Solid Hospital Waste in A Nigerian Tertiary Hospital. The Free Library. (September, 25). http://www.thefreelibrary.com/Improving+the+Management+of+Solid+Hospital+Waste+in+A+Nigerian...-a01073990679. Accessed January 29, 2011

National Institute for Occupational Safety and Health (NIOSH) (2004). Preventing Occupational Exposure to Antineoplastic and other Hazardous Drugs in Healthcare Settings. http://www.cdc.gov/niosh/docs/2004-165/default.html. Assessed on 23/11/2015.

Ngwuluka, N., Ochekpe, N., Odumosu, P., and Sunday (2012). A Waste Management in Healthcare Establishment within Jos Metropolis, Nigeria. *African Journal of Environmental Science and Technology*: 3(12): 459-465.

Nwachukwu, N.C. Frank, A.O. and Ositadinma, C.U. (2013). Health Care Waste Management – Public Health Benefits, and the Need for Effective Environmental Regulatory Surveillance in Federal Republic of Nigeria. http://dx.doi.org/10.5772/53196. Accessed on 24/09/2014.

Ogbonna, D. N. (2011). Characteristics and Waste Management Practices of Medical Wastes in Healthcare Institutions in Port Harcourt, Nigeria, *Journal of Soil Science and Environmental Management*, 2(5): 132-141.

Ogunbameru, O.A. (2008). Sociological Theory: Ibadan, Penthouse Publisher (Visionary Publisher). Ibadan, Nigeria.

Oke, A. (2008): Management of immunization Solid Wastes in Kano, State, Nigeria. Waste Management, 28:2512 – 2521.

Olubukola, B.O. (2009). Comparative Analysis of Health Care Waste Management Practice in Two General Hospitals in Nigeria. Available at http://www.eco-web.com/edi/index.htm. Accessed August 28, 2015.

Orloff K, and Falk H. (2003). "An Internati onal Perspective on Hazardous Waste Practices" International Journal of Hygiene and Environmental Health. 2(10): 291-302.

Oyaigbervwen (1988). The impact of clinical waste in the recurrence of nosocomial infections in University of Benin Teaching Hospital. *Nigerian Journal of Environmental Protection*, 4(2): 15-19.

PATH (2009). Achieving Effective Sharps Waste Management in GAVI Host Countries, A Proposed Approach with Estimates of Cost 2006. Available at http://.www.Path.org/files/TS_ach_eff_swm.pdf. Accessed 27th Nov. 2014.

Patil GV, Pokhrel K (2005). Biomedical solid waste management in an Indian hospital: a case study. Waste Manage. 25(6): 592-599.

Patil, A.D. and Shekdar, A.V. (2001). Health-care Waste Management in India. *Journal of Environmental Management.* 63(2): 211-220.

Phengxay, S, Okumura, J., Miyoshi, M., Sakisaka, K., Kuroiwa, C. and Phengxay, M. (2005). Healthcare Waste Management in Lao PDR: A Case Study. *Journal of Waste Management Research.* 23: 571-581.

Pruss, A., Giroult, E. and Rushbrook, P. (eds.) (1999). Safe Management of Waste from Health Care Activities. World Health Organization, Geneva, Switzerland.

Prüss-Ustün, A., Rapiti, E. and Hutin, Y. (2005). Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *American Journal of Industrial Medicine*, 48:482–490.

Radha, K.V., Kalaivani, K. and Lavanya, R. (2009). A Case Study of Biomedical Waste Management in Hospitals. *Global Journal of Health Science*, 1:82–88.

Report of High Power Committee (RHPC, 1995). Urban Solid Waste Management, Planning Commission, Government of India. 35-47.

Reuters News Agency. (2008). "Afghanistan Medical Waste Poses Health Risks in Urban Areas" url:http//www.alertnet.org/thenews/newsdesk/IRIN/fbOb02c252900fdl8716034303f6dc c4.htm. Accessed 13/04/2015

Schaefer, M.E. (2006). Hazardous Waste Management. *Dental Clinics of North America*. 35: 383-390.

Shaba, B.O. (2002). Solid Waste Management in the College of Medicine and LUTH, Lagos, Post Graduate Diploma Dissertation, University of Ibadan, Nigeria.

Sharma, S. (2011). Awareness about bio-medical waste management among health care personnel of some important medical centres in Agra. *International Journal of Environmental Science and Development.* 1: 251-255.

Singh, R., Kishore, J., Mathur, R.G., Mandal, K. and Puri S. (2002). The Role of an Information Booklet on Bio-Medical Waste Management for Nurses. *Nurse Journal of India;* 93(12):271-272.

Slack, R.J., Gronow, J.R., Voulvoulis, N., (2004). Hazardous Components of House Waste. Critical Review in *Journal of Environmental Science and Technology*, 34(5): 419-445.

Smith, C.A. (2002). Managing Pharmaceutical Waste-what pharmacist should know. J. Pharm. Soc. Wisconsin, pp. 17-22. http://www.pharmecology.com/pedd/pdf/Managing%20Pharmaceutical%20Waste.pdf. Assessed on 12/10/2015.

Sobotova, L., Noscova, T., Volekova, A. and Aghol, G. (2004). "Practical Training on Nosocomial Infection in a Hospital Environment". *Indoor built environ.* 5(1): 73-76.

Solberg, K.E. (2009). Trade in Medical Waste Causes Deaths in India. The lancet onlineRetrieved16-05-2013http//www.thelancet/journals/lancet/articles/11;140-6736(09)60632-2. Assessed on 24/11/2014.

Sridhar, M.K.C. and Ayeni, O.B. (2002). Infection Potential of Wastes from Selected Healthcare Facilities in Ibadan, Nigeria, Proceedings of the Third International Conference on Environment and Health, Chennai, India, Eds Martin J. Bunch, V. Madha Suresh and T. Vasantha Kumaran, December 15-17, 2002, Department of Geography, University of Madras and Faculty of Environmental Studies, York University, pp. 512-519.

Stanley, H.O., Okpara, K.E., Chukwujekwu, D.C., Agbozu, I.E. and Nyenke, C.U. (2011). Healthcare Waste Management in Port Harcourt Metropolis, *American Journal of Scientific and Industrial Research*; 2(5):767-773.

Taghipour, H. and Mosaferi, M. (2009). The Challenge of Medical Waste Management: A Case Study in Northwest Iran-Tabriz . *Waste Management Resource,* 27:(4), 328- 335.

Talaat, M., Arabi, Y. and Al-Shirawi, N. (2003). Occupational exposure to needlestick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *American Journal of Infection Control*, 31:469–474.

Talaat, M., Memish, Z. and Anzueto, B. (2006). Evolution of infection control in Egypt: achievements and challenges. *American Journal of Infection Control*, 34:193–200.

Taru, P. and Kururega, A. T. (2005): Solid Medical Waste Management. The Case of Partirenyatwa Hospital, Zimbabwe, Revista Biomedical, 16: 153 – 158.

Townend W.K. and Cheeseman, C.R. (2005). Guidelines for the Evaluation and Assessment of the Sustainable use of Resources and of Wastes Management at Healthcare Facilities. *Journal of Waste Manage. Res.*, 23: 398- 408.

Tudor, T.L., Marsh, C.L., Butler, S. and Van Horn, J.L. (2008). Realizing Resource Efficiency in the Management of Health Care Waste from the Cornwall National Health Service (NHS) in UK. *Waste Management*. 28(7):1209- 1218.

Tukaram, B.Z. and Asha, K.P. (2014). Assessment of Effectiveness of Educational Intervention of Knowledge Among Bio-Medical Waste Handlers. *International Journal of Science and Research (IJSR).* Medical Sciences Deemed University, Karad- 415539(Maharashtra) India. 3: (9). 22-24.

Umar, A.B. and Mohammed, N.Y. (2014). Hospital Waste Management Practices: A Case Study of Primary Health Care Centers, In Fagge Local Government Area, Kano State. *IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320–1959.p- ISSN: 2320–1940 (Nov.-Dec. 2014), PP 26-33* *www.iosrjournals.org* 3 (6.2): 26-23.

United State Agency for International Development (USAID 2009). Health-Care Waste Management Plan in Nigeria in the Daily Trust Newspaper. March 19, pp: 32.

United State Agency for International Development (USAID 2011). An Assessment of Injection Safety and Healthcare Waste Management in Nigeria. A Selected Health Facilities in Abuja Municipal Area Council, Federal Capital Territory, and Makurdi Local Government Area Benue State.

Vivan EL, Blamah NV, Ezemokwe I, Okafor CI (2011) An Assessment of Hospital Waste Management in Some Selected Hospitals in Zonkwa District of Zangon-Kataf Local Government Area of Kaduna State. *International Journal of Environmental Studies*.

Wahab, A.B. (1991). Waste Disposal and Environmental hazard Control, Lagos. West African Health Examination Board.

*Waste from health-care activities. Fact sheet No. 253, November 2011*. World Health Organization [online factsheet] (http:// www.who.int/mediacentre/factsheets/fs253/en/, accessed 27 December 2015).

World Health Organization (2004). Safe Healthcare Waste Management, Policy paper, Fact sheet. Geneva. Available at http//www.who.int/entity/immunization_safety/publications/waste_management /en/HCWM_policy_paper_E.pdf Accessed12 September 2014.

World Health Organization (2005). "Healthcare Waste Management (HCWM): Healthcare Waste and its Safe Management". Url:http://www.health care waste. Org/en/l15_overview.html. 2004 Accessed 14/4/2014.

World Health Organization (WHO) (2009), Waste from Healthcare activities, Fact Sheet No. 253 Geneva.

World Health Organization (1999). Unsafe injection Practices and transmission of blood borne pathogens. Bulletin of World Health Organization, 77: 787-819.

World Health Organization (2010). Technical Paper on Infection Prevention and Control in Healthcare: Time For Collaborative Action. Regional Committee for the Eastern Mediterranean, Fifty-Seventh Session EM/RC57/6 Original: Arabic August 2010. Assessed on line from http://www.emrc/arabic/easternmediterranaen.pfd. Retrieved on 17/08/2015.

## APPENDIX I

## QUESTIONNAIRES

Department of Sociology,
Faculty of Social Sciences,
Ahmadu Bello University,
Zaria.

Dear Respondent,

I am a postgraduate student of the Department of Sociology, Ahmadu Bello University Zaria, conducting a research study on **An Assessment of Hospital Waste Management in Ahmadu Bello University Teaching Hospital (ABUTH) Shika-Zaria, Kaduna State.** This is in partial fulfillment of M.Sc. Sociology. Your maximum cooperation will be highly appreciated. Please be assured that the information you give will be for academic purpose and will be treated with anonymity and confidentiality.

Thanks for your cooperation.

Yours faithfully,
**Fatuase, Philip Ayodele.**

**Instruction: Please Fill or tick [√] the question as honestly as possible. The survey is anonymous.**

**Section A: Socio-Demographic Characteristics of Respondents**

1. Sex: (a) Male [ ] (b) Female [ ]
2. Age: (a) 20-24 [ ] (b) 25-29 [ ] (c) 30-34 [ ] (d) 35-39 [ ] (e) 40-44 [ ] (f) 45-49 [ ] (g) 50-54 [ ] (h) 55-59 [ ] (i) 60-64 [ ] (j) 65 and above [ ]
3. Marital Status: (a) Married [ ] (b) Single [ ] (c) Widowed [ ] (d) Divorced [ ]
4. Religion: (a) Christianity [ ] (b) Islam [ ] (c) Traditional [ ]
5. Educational Level: (a) Tertiary [ ] (b) Secondary [ ] (c) Primary [ ]
6. Profession: (a) Doctor [ ] (b) Nurse [ ] (c) Pharmacist [ ] (d) Med. Lab Scientist [ ] (e) Healthcare attendant [ ] (f) Waste collectors [ ] (g) Cleaners [ ] (h) Clerical Staff [ ] (i) Others (Specify)_____
7. Department/Unit_____
8. Years of experience: (a) 1-5 [ ] (b) 6-10 [ ] (c) 11-15 [ ] (d) 16-20 [ ] (e) 21 and above [ ]

**Section B: Types of Hospital Waste generated in ABUTH Zaria?**

9. What do you consider to be waste? _____
   _____
10. Does the hospital generate any waste of special concern? (a) Yes [ ] (b) No [ ]
11. If yes, what type of waste? (Tick as many as possible) (a) Plastic bags/containers [ ] (b) Used papers [ ] (c) Syringes [ ] (d) Used X-ray films [ ] (e) Needles/Blades/Scalpels [ ] (f) Bottles [ ] (g) Expired drugs [ ] (h) Chemicals waste from lab [ ] (i) Blood [ ] (j) Bandages/cotton [ ] (k) Placenta/foetuses/fibroids [ ] (l) Radioactive waste [ ] (m) Mortuary waste [ ] (n) Laundry wastes [ ] (o) Food wastes [ ] (p) Others (specify) _____
12. Are hospital wastes segregated into types? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
13. If yes, how often? (a) Always [ ] (b) Sometimes [ ] (c) Rarely [ ]
14. If the wastes are segregated, who does the sorting? (a) From source of generation by healthcare staff [ ] (b) Waste workers (c) Others (specify)_____
15. As healthcare worker, do you segregate waste at source? (a) Yes [ ] (b) No [ ]
16. What section generates hazardous wastes? _____
17. How do you as a healthcare worker segregate sharps? (a) use of safety box [ ] (b) puncture proof containers [ ] (c) plastic bags [ ] (d) empty fluid containers [ ] (e) Other (specify)_____

**Section C: Attitude of workers toward waste management in ABUTH Zaria?**

**A = Agree, SA = Strongly Agree, D = Disagree, SD = Strongly Disagree**

| | | **A** | **SA** | **D** | **SD** |
|---|---|---|---|---|---|
| 18 | Hospital wastes are not problems to worry about | | | | |
| 19. | Attitude of workers towards hospital waste management is an important issue to be considered | | | | |
| 20. | Workers attitude towards hospital waste management is satisfactory | | | | |
| 21. | Hospital waste management is a collective responsibility of each and every hospital worker | | | | |
| 22. | Hospital waste management add extra burden to hospital workers | | | | |
| 23. | Hospital workers' training on hospital waste management is satisfactory | | | | |
| 24. | Hospital workers segregate wastes at the source where they are generated. | | | | |
| 25. | Positive attitude towards hospital waste increases financial burden on waste management. | | | | |

**Section D: Effects of hospital waste on workers in ABUTH Zaria?**

26. What are the effects of hospital waste on worker?
    (a) Disease infection [ ] (b) create burden in the place of work [ ] (c) Other (specify) _____
27. Does the waste disposal system pose any risk to healthcare workers in general?
    (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
28. If yes, give example, _____
    _____
29. Do you know of anyone who has ever contracted any disease as a result of exposure to hospital waste? (a) Yes [ ] (b) No [ ] (c) Don't know
30. Have you ever had injury in the course of disposing waste?
    (a) Yes [ ] (b) No [ ]
31. If yes, what type of injury did you sustain? (a) Cut [ ] (b) broken bones [ ]
    (c) Others please (specify) _____
32. Have you ever been ill as a result of exposure to hospital wastes?
    (a) Yes [ ] (b) No [ ]
33. If yes, what was the nature of illness?_____
34. Did you report your illness to the appropriate authority? (a) Yes [ ] (b) [ ]
35. What was their response? (a) Nothing [ ] (b) sick leave [ ] (c) free treatment [ ]
    (d) Others (specify)_____

**Section E: Challenges of healthcare waste management in ABUTH Zaria?**

36. Are you aware of healthcare waste management in ABUTH Zaria?
    (a) Yes [ ] (b) No [ ]
37. Who is responsible for healthcare waste management in ABUTH Zaria?
    _____
38. How would you rate the management of waste generated by this hospital? (a) Very satisfactory [ ] (b) Somewhat satisfactory [ ] (c) Not satisfactory [ ]
39. Are medical wastes collected from the wards/labs daily? (a) Yes [ ] (b) No [ ]
40. If yes, how often? (a) Once a day [ ] (b) 2-3 times a day [ ] (c) Once in a week [ ]
    (d) 2-3 times a week [ ] (e) Once in a month [ ]
41. Are wastes properly segregated at the source according to different categories?
    (a) Yes [ ] (b) No [ ]
42. Are you as a healthcare worker familiar with the classification and segregation requirements? (a) Yes [ ] (b) No [ ]

43. Are infectious wastes labeled with biohazards symbols? (a) Yes [ ] (b) No [ ]
44. How does the hospital segregate sharps? (a) use of safety box [ ] (b) puncture proof containers [ ] (c) plastic bags [ ] (d) empty fluid containers [ ] (e) Others (Specify)_____
45. Does the hospital use color code for different types of waste? (a) Yes [ ] (b) No [ ]
46. How are infectious wastes segregated? (a) use of plastic bags [ ] (b) steel containers [ ] (c) disinfectant containers [ ] (d) none of the above [ ] (e) all of the above [ ] (f) Others (specify) _____
47. Are used syringe needles collected without recapping? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
48. Are used syringe needles recycled for reuse? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
49. Are sharp containers or needle destroyer available always? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
50. How is waste collected within the hospital? (a) In dustbin [ ] (b) Metal drums [ ] (c) Plastic bags [ ] (d) Others (specify) _____
51. How are wastes transported to the disposal site? (a) Using trolley [ ] (b) wheel barrow [ ] (c) using bare hands [ ] (d) Using carts [ ] (e) using refuse truck [ ] Others (specify)_____
52. Does the transportation system for waste disposal meet the international standard? (a) Yes [ ] (b) No [ ] (c) Don't know
53. Are healthcare wastes stored before disposal? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
54. Do you remove waste before the maximum disposal time limit? (a) Yes [ ] (b) No []
55. Are the waste treated before disposal? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]
56. What methods are used in the treatment of waste? (Tick as many as applicable) (a) Autoclaving [ ] (b) Incineration [ ] (c) Encapsulation [ ] (d) Waste burial [ ] (e) Chemical disinfection [ ] (f) others specify_____
57. How are waste transported for final disposal? (a) Open vehicle [ ] (b) Enclosed compaction vehicle [ ] (c) Others specify_____
58. What is the method for final disposal of waste? (a) Landfill [ ] (b) Shredded (c) Open burning [ ] (d) Combustion [ ] (e) Others specify _____
59. Does any scavenging of healthcare waste occur at the treatment/disposal site? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

60. Does the hospital management have problems with facilities currently used in healthcare waste practices? (a) Yes [ ] (b) No [ ] (c) Don't know
61. If yes, what kind of problems are they? _____
_____

**Section F: Safety measures put in place for healthcare workers.**

62. Are there public awareness programme on healthcare waste management?
(a) Yes [ ] (b) No [ ] (c) Don't know [ ]
63. If yes, give examples_____
64. Does the management conduct any training on healthcare waste management?
(a) Yes [ ] (b) No [ ] (c) Don't know [ ]
65. If yes, have you ever had any training on healthcare waste management?
(a) Yes [ ] (b) No [ ]
66. If yes, what type of training did you receive? (a) short time course [ ] (b) workshops [ ] (c) Seminars [ ]
67. How many times have you been exposed to training/seminals on healthcare waste management? (a) Once [ ] (b) Twice [ ] (c) Three times [ ] (d) Over three times [ ]
68. What type of precaution do you take when handling waste products? (Tick as many as applicable). Use gloves [ ] (b) Protective gown [ ] (c) Mask/glasses [ ]
(d) Boots [ ] (e) None of the above [ ] (f) All of the above [ ] (g) Others (specify)
_____
69. As hospital worker, are you given hepatitis and tetanus vaccinations?
(a) Yes [ ] (b) No [ ]
70. If not, why? _____
71. What measure do you suggest to improve the situation of hospital waste management in ABUTH to
(a) the authorities
i._____
ii._____
iii._____
(b) the staff
i._____
ii._____
iii._____
(c) The government
i._____
ii._____
iii._____

## APPENDIX II

## IN-DEPTH INTERVIEW (IDI) GUIDE

1. What can you say about waste in general?
   **Probe**
   - What about hospital waste?
   - What are the types of waste generated in ABUTH?
   - What sections produce them?
2. What are the problems generally being experienced regarding waste management in ABUTH, Zaria?
   **Probe**
   - How satisfied are you with the level of hospital waste management in ABUTH Zaria?
   - Give reasons.
3. What are the implications of hospital wastes management on workers in ABUTH
   **Probe**
   - Why did you say so?
   - Have you had experience of any?
   - Do you know of injuries that workers had contracted in the past?
   - How were the cases treated?
   - Any other implications of waste management/disposal?
4. What is the current practice regarding waste management in ABUTH Zaria?
   **Probe**
   - Why did you say so?
   - What of in terms of sorting, recycling and disposal
   - Are the wastes treated before disposal
   - How many times wastes are collected from each units/wards
   - What are the modes of collection, transportation and final disposal
   - Do you have enough facilities, equipment and personnel on waste management?
5. What do you think is the effect of hospital waste management on workers?
   **Probe**
   - What of patients?
   - What about the general public?
   - How can these health risks be reduced?
6. Are you aware of any policy on healthcare waste management in Nigeria?
   **Probe**
   - In your own opinion is the policy on hospital waste by the hospital authority properly implemented?
   - Is ABUTH measuring up to standard?
7. Does the management have budget for hospital wastes management?
   **Probe**
   - Does it cover the financial cost for the maintenance of hospital waste?
   - Does the management have any outside parties hired to help with the facility's waste collection, treatment, transportation or disposal of wastes?
   - What aspect of wastes are they responsible for?
   - Who is accountable for their performance?
8. In your opinion what should be the precautionary measures put in place for ABUTH workers on waste management?
   **Probe**
   - In the event of occupational hazard, is there treatment or compensation?
   - How can waste be more effectively managed?
   - What do you think, you as an individual can do to reduced healthcare waste in ABUTH Zaria?
9. What role should management play?
   - Role of staff
   - Role of the general public
   - Any other advice?

Thank you.

## APPENDIX III

## OBSERVATION GUIDE

Department of Sociology
Faculty of Social Sciences
Ahmadu Bello University,
Zaria.

**Observation Check List on Assessment of Hospital Waste Management in ABUTH, Shika-Zaria, Kaduna State, Nigeria**

1. To observe the nurses and doctors on whether they segregate waste at the source while treating patients.

2. To observe healthcare attendants, waste cleaners and waste collectors on personal protective equipment worn as prescribed by WHO standard.

3. To observe the process of waste segregation into different categories of colour coding as prescribed by WHO standard.

4. To observe waste disposal methods:
   (a) Vehicles used in transporting the wastes,
   (b) How wastes are treated

5. To observe the dumping sites.

## APPENDIX IV


# HEALTH RESEARCH ETHICS COMMITTEE

**AHMADU BELLO UNIVERSITY TEACHING HOSPITAL**

**SHIKA - ZARIA, NIGERIA.**

*E-mail: abuthshika@yahoo.com* *website: www.abuth.org*

Chairman of Board: **Chief. Shuaib Oyedokun Afolabi** *Fnil*
Chief Medical Director: **Prof. Lawal Khalid,** *MBBS, FMCS, FWACS, FRCS(ED) mni*
Chairman, Medical Advisory Committee: **Prof. Abdullahi Mohammed,** *MBBS, FWACP, FICS*
Director of Administration: **Barr. Ishak Bello,** *LL.B, BL., LL.M, PGDM, AHAN, FCAI*


*Our Ref:* ABUTH/HREC/CL/05 *Date:* 12th July, 2016

*Your Ref:*

***ABUTH HREC FULL ETHICAL CLEARANCE CERTIFICATE***

**The Implications of Improper Hospital Wastes Management on Healthcare Workers in Ahmadu Bello University Teaching Hospital (ABUTH) Zaria Kaduna State**

| | | |
|---|---|---|
| **ABUTH Ethics Committee assigned number:** | - | ABUTHZ/HREC/S06 / 2015. |
| **Name of the principal Investigator:** | - | **Mr. Fatuase Philip Ayodele** |
| **Address of the Principal Investigator:** | - | Dept. of Sociology, ABU Zaria |
| **Date of receipt of valid application:** | - | 6Th May, 2016 |
| **Date of meeting when final determination** | | |
| **On Ethical approval was made:** | - | 7Th June, 2016 |

This is to inform you that the research described in the submitted protocol, the consent forms and other participant information materials have been reviewed and given **full approval by the Health Research Ethics Committee.**

Please note: this approval dates from **12Th July, 2016 – 12Th July, 2017**

No participant recruitment into this research may be conducted outside these dates.

All informed consent forms in this study must carry the ABUTH HREC number assigned to this research and the duration of ABUTH HREC approval of the study.

This HREC expects that you submit your application as well as an annual report for ethical clearance renewal 3 months prior to expiration of study dates. This is to enable you obtain renewal of your approval and avoid interruption of your research.

If there is delay in starting the research, please inform the ABUTH HREC so that starting dates can be adjusted accordingly.

No changes are permitted in the research without prior approval by ABUTH HREC, except in circumstances outlined in national code for Health Research Ethics: http://www.nhrec.net.

ABUTH HREC reserves the right to conduct compliance assessment visits to your research site without prior notification.

Prof. Aisha.N. Mamman MBBS, FMCPath
Chairman, ABUTH HREC

## APPENDIX V

## LIST OF INFORMANTS

| S/N | NAMES | POST |
|---|---|---|
| 1 | Chief Medical Director, ABUTH Zaria | CMD |
| 2 | Waste Manager | Operating Manager |
| 3 | Royal Care Company Manager | Manager |
| 4 | Paul Davis Company Manager | Manager |
| 5 | Doctor | |
| 6 | Nurse | |
| 7 | Laboratory Scientist | |
| 8 | Waste Collector 1 | |
| 9 | Waste Collector 2 | |
| 10 | Cleaner | |

## APPENDIX VI

## INFORMED CONSENT

My name is FATUASE, PHILIP AYODELE. I am a M.Sc. student from the Department of Sociology, Faculty of Social Sciences, Ahmadu Bello University Zaria. I am conducting a research study on Assessment Hospital Wastes Management in Ahmadu Bello University Teaching Hospital Shika-Zaria, Kaduna State, Nigeria. This study is designed for Academic Research purpose as well as the benefit of the ABUTH Healthcare Workers and the community at large. This study aim at identifying the gaps in current practices of healthcare waste management in ABUTH Zaria in line with the international best practices and the implications as well as recommend ways of bridging this gap. The confidentiality of the respondent will be guaranteed and the results of the study will be for academic purpose. The study is voluntary and with no cost/burden on the subject(s).

**INFORMED CONSENT FORM**

I……..…..…..of…….……has voluntarily agreed to be one of the subjects in this study – Assessment of Hospital Wastes Management in ABUTH, Shika-Zaria, Kaduna State, Nigeria. The aim of the study was explained to me. I have had the opportunity to ask questions about it and the questions that I have asked have been answered to my satisfaction.

Participant's Name…… Sign……

Researcher's Name……..... Sign……

## BA DA YARDA TA

Sunana FATUASE, PHILIP AYODELE. Ni dalibi ne mai karatun digiri na biyu a sashen Ilimin Halayyar Zaman Jama'a, a Fakaltin Social Sciences, Jami'ar Ahamdu Bello, Zaria. Ina gudanar da wani bincike a kan Abubuwan Illa da kayan sharer asibiti ke kawoiwa a cikin lafiyar ma'iakatan Asibitin koyarwa na Jami'ar Ahmadu Bello, Zaria, Jihar Kaduna. Wannan binciken an tsara shi ne don manufar ilimi kazalike don sauran al'ummomi da ke zagaye. Wannan bincike na da nufin gane gibi a halin yanzu, a wajen ayyukan kiwon lafiya da sun danganci yadda a ke saraffa shara a ABUTH Zaria. Za a kwatanta wannan ne da yadda ya kamata a yi shi kamar yadda sauran duniya da ta u gaba ke yi. A karshen shi, zan bad a shawarwari a kan hanya mafi kyau day a kamata a bi don cike gibin. Zan tabbatar da tsare sirrin wanda duk ya sa hannu cikin wannan binciken, kuma sakamakon binciken sai zamam domin amfanin kara ilimi. Binciken na sa kai ne, ba a biyan kowa kudi ba saboda ya sa hannu cikin sa.

**TAKARDAR BADA YARDA TA**

Ni ……. Wanda ke…….. na yanda ba tare da tilastawa ba, in zama abin nazari a cikin wannan binciken na Abubuwan illa da kayan sharer asibiti ke iya kawowa a kan ma'aikatan lafiya na ABUTH, Zaria, Jihar Kaduna. An bayyana mani manufar binciken. Na kuma samu dammar yin tambayoyi a kan manufar, kuma an bani amsoshi da sun gamsar da ni.

Sunan wanda a ke bincika…… Sa hannu……

Sunan Mai Bincike…… Sa hannu……..

## INFORMED CONSENT

Sunna na FATUASE, PHILIP AYODELE ina yin Digiri na na biyu a fannin Dabi'an Dan Adam, a Tsangayar Sanin Kimiyyar Dabi'an Dan Adam dake Jami'ar Ahmadu Bello dake Zaria. Ina gudanar da bincike ne akan alfanin kiyaye mehalli akan lafiyar Ma'aikatan Asibitin Koyarwa ta Jami'ar Ahmadu Bello dake Zaria, Jahar Kaduna. Wannan bincike an tsara shi ne don bunkasa Ilimi da kuma lafiyar ma'aikatan Asibitin da sauran al'umma baki daya. Manufar wannan bincike shine gano matsalolin dake tattare da aikin kula da tsafta a Asibitin koyarwa ta Jami'ar A.B.U. dake Zaria, in an kwantanta shi da yanda akeyi a ksashen da suka ci gaba a duniya don samar da hanyoyin da za'a gyara. Za'a kiyaye da rufan asirin kowone ya ba da amsoci akan wana biciken. Ko wone za ba d a amsoci akan wannan biciken ba dole ba ne.

## INFORMED CONSENT FORM

Ni…… na…… na yan da, ba na kama dole ba ne, a bincike na sani akan alfanin kiyaye mehalli akan lafiyar Ma'aikatan Asibitin Koyarwa ta Jami'ar Ahmadu Bello dake Zaria, Jahar Kaduna. Ku ma a fasara mu ni dalili wannna biciken. Na samu ayan tambaya akan aiki nan, Kuma duka tambayoyi na a gyamani.

Suna mai ba da amsoci…… Sa anu…….

Suna mai bincike……. Sa anu……