Republic of Malawi

Malawi Health Emergency Preparedness, Response, and Resilience Project

P505187

INFECTION CONTROL AND WASTE MANAGEMENT PLAN

(ICWMP)

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Executive Summary

The Malawi Health Emergency Preparedness, Response, and Resilience Project (MHPRREP), funded by the World Bank through the Ministry of Finance and Economic Affairs, is a national initiative aimed at strengthening Malawi's healthcare system to effectively manage health emergencies. The Project Development Objective (PDO) is to strengthen health system resilience and multisectoral preparedness and response to health emergencies in the Republic of Malawi. The project has several components of which some will work directly towards infection control and management of waste from the health care service. The key components of the project include (i) Strengthening the Preparedness and Resilience of the Health System to Manage Health Emergencies, (ii) Improving Early Detection of, and Response to, Health Emergencies, Through a Multisectoral Approach, (iii), Project Management and Monitoring and Evaluation and (iv) Contingent Emergency Response Component (CERC).

Despite that the project will not undertake any infrastructural development activities, several procurements are anticipated which include purchase of equipment, medicines, medical equipment and reagents. The use of the procured materials and their associated facilities have a potential to pose environmental and occupational risks emanating from the general of healthcare waste coupled with existing poor systems of managing waste in the health sector.

Malawi Health Emergency Preparedness, Response and Resilience Program (MHEPRRP) was rated as moderate in terms of environmental and social risk triggering the development of various safeguards instruments including this infection control and waste management plan (ICWMP) which provides specific guidelines on infection control and health care waste management for Malawi. The ICWMP collates information from International Best Practices (WHO guidelines), World Bank Environmental Health and Safety guidelines, World Bank Environmental Health and Safety Guidelines for Health Care facilities and Malawi Policies and legislation.

The implementation of ICWMP will; significantly reduce the risk of infections within healthcare facilities and surrounding communities; establish a sustainable, environmentally friendly waste management system that complies with local and international standards; enhance the resilience of Malawi's healthcare system to effectively respond to future health emergencies and promote public trust in healthcare services through visible improvements in infection control and waste management practices.

The ICWMP for the HEPRRP is a critical component of Malawi's efforts to strengthen its health emergency response and resilience. By addressing infection control and waste management challenges, the plan ensures that healthcare delivery is safe, sustainable, and aligned with the best global practices. The World Bank's support for this initiative reflects a commitment to improving health outcomes and environmental sustainability in Malawi.

Success of the implementation, monitoring and reporting of the ICWMP is depended on consolidated efforts, awareness, training and lessons learned from various partners of the project implementation at different levels mainly national, district and local level.

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ABBREVIATION / ACRONYMS

CHAM	Christian Health Association of Malawi
CMST	Central Medical Stores Trust
COM	College of Medicine
COVID-19	Corona Virus Disease-2019
DC	District Commissioner
DHO	District Health Officer
DHSS	Director of Health and Social Services
EHS	Environmental Health and Safety
EHU	Environmental Health Unit
EOC	Emergency Operations Centre
EPR	Emergency Preparedness Response
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
GCP	Good Combustion Practice
GDP	Malawi's Gross Domestic Product
GMPP	Good Microbiological Practices and Procedures
GoM	Government of Malawi
HCF	HealthCare Facilities
HCW	HealthCare Waste
HCWs	HealthCare Workers
HCWM	HealthCare Waste Management

HAIs	Hospital Acquired Infections
HH	Hand Hygiene
HSAs	Health Surveillance Assistants
ICWMP	Infection Control and Waste Management Plan
IPC	Infection Prevention and Control
LMP	Labour Management Procedure
MHEPRRP	Malawi Health Emergency Preparedness, Response and Resilience Program
MCM	Medical Council of Malawi
MLW	Malawi Liverpool Welcome Trust
MOH	Ministry of Health
MP	Member of Parliament
NGO	Non-Governmental Organization
NHRL	National Health Reference laboratory
NMCM	Nurses and Midwives Council of Malawi
NTF	National Task Force
NWP	National Water Policy
OPC	Office of President and Cabinet
PEHO	Principle Environmental Health Officer
PFP	Private for Profit
PHIM	Public Health Institute of Malawi
PIT	Project Implementation Team
PMRA	Pharmacy Medicine Regulatory Authority
PNFT	Private Not for Profit
PPE	Personal Protective Equipment
QMOs	Quality Management Offices (Zonal)
SATBHSSP	Southern Africa Tuberculosis and Health Services Support Project

SEP	Stakeholder Engagement Plan
T/As	Traditional Authorities
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
ZHSO	Zonal Health Support Offices

Definition of Key Terms[1]

- **Chemical waste**: Is any solid, liquid or gaseous waste material that, if improperly managed or disposed of, may pause substantial hazard to human health and the environment. For example, solvents and reagents used for laboratory preparations, disinfectants, sterilant and heavy metals contained in medical devices (e.g. mercury in broken thermometers) and batteries.
- **Cytotoxic waste**: Waste containing substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites.
- **Healthcare waste**: Healthcare waste includes all the waste generated by health-care establishments, research facilities, and laboratories. In addition, it includes the waste originating from "minor" or "scattered" sources—such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.).
- **Healthcare Waste Handler**: means a generator, transporter or receiver of trackable waste.
- **Healthcare Waste Management**: The processes and actions required to manage waste from its generation to its final disposal.
- **Highly infectious waste**: These includes anatomical and pathological waste for example; human tissues, organs or fluids, body parts and contaminated animal carcasses.
- **Infectious waste**: Waste contaminated with blood and other bodily fluids (e.g. from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories), or waste from patients with infections (e.g. swabs, bandages and disposable medical devices).
- **Non-Infectious waste**: Waste that does not pose any particular biological, chemical, radioactive or physical hazard e.g. papers, packaging materials, plastic bottles etc.
- **Pharmaceutical waste**: Expired, unusable / contaminated medicine and medical supplies as well as vaccines.
- **Pathological waste**: human tissues, organs or fluids, body parts and contaminated animal carcasses.
- **Radioactive waste**: Is a type of hazardous waste that contains radioactive material such as products contaminated by radionuclides including radioactive diagnostic material or radio therapeutic materials.
- **Sharps waste**: Is a form of biomedical waste composed of used sharps which includes any device or object used to puncture or lacerate the skin. For example, syringes, needles, disposable scalpels and blades etc.

[1] Definitions obtained from the Healthcare Waste Management Policy

Chapter one: Introduction

This chapter outlines the background of the ICWMP, objectives of the plan, emphasizing the importance of preventing infections and ensuring safe, sustainable waste management practices to protect public health and the environment in the targeted health facilities in the country.

1.1 Background

Malawi Government with the financing from the World Bank is implementing a Malawi Health Emergency Preparedness, Response and Resilience Program through a Multiphase Programmatic Approach which is expected to be implemented from June 2024 to December 2029 with expected project closure of September 2030. The program development objective is to strengthen health system resilience and multisectoral preparedness and response to health emergencies in Eastern and Southern Africa. Apart from Malawi, the programme is being implemented in other countries like Kenya, Ethiopia, Sao Tome and Principe, the East, Central and Southern Africa. Specifically for Malawi, the program is aiming at strengthening health system resilience and multisectoral preparedness and response to health emergencies in the Republic of Malawi. The project is expected to be implemented at a cost of US$D 60 million, with International Development Association (IDA) contributing US$50.0 million, and the Global Financing Facility for Women, Children and Adolescents contributing US$10.0 million.

The project has been developed with the background that the country has recently experienced health emergencies which have heavily affected the health sector. Some of the emergencies include; climate-related disasters, health emergencies and pandemics like COVID 19, high poverty rates, and overreliance on agriculture as a source of livelihood. However, the country has taken positive steps to curb these challenges through development of policies to increase the macro and micro economic performance of the country. The implementation of this project will enable the country to ably respond health related emergencies hereby increasing the economic development and the enhanced livelihood of the people.

1.2 Objective of the project

Project Development Objective (PDO) is to strengthen health system resilience and Multisectoral preparedness and response to health emergencies in the Republic of Malawi.

1.3 Project components

The Malawi Health Emergency Preparedness, Response and Resilience Project Using the Multiphase Programmatic Approach has the following four key components[2] :

- Component 1: Strengthening the Preparedness and Resilience of the Health System to Manage Health Emergencies

[2] PAD for the Malawi Health Emergency Preparedness, Response and Resilience Project Using the Multiphase Programmatic Approach (P505187)

- Component 2: Improving Early Detection of, and Response to, health emergencies
- Component 3: Project Management and Monitoring and Evaluation
- Component 4: Contingent Emergency Response Component (CERC)

However, the following table 1-1 provides sub-components of each of the project components.

Table 1- 1: Sub-components of each of the project components

S/n	Project component	Project Sub-component
1.1	Component 1: Strengthening the Preparedness and Resilience of the Health System to Manage Health Emergency	Enhancing Multisectoral Planning, Financing, and Governance for Improved Resilience to health emergencies
1.2		Strengthening Health Workforce Development
1.3		Improving Access to Quality Health Commodities
1.4		Enhancing Information Systems for health emergencies and Digitalization of the Health Sector
2.1	Component 2: Improving Early Detection of, and Response to health emergencies	Collaborative Multisectoral Surveillance and Laboratory Diagnostics
2.2		Emergency Management, Coordination, and Essential Service Continuity
2.3		Risk Communication and Community Engagement (RCCE), Empowerment, and Social Protection During health emergencies
3.1	Component 3: Project Management and Monitoring and Evaluation	Enhancing Project Monitoring and Evaluation
3.2		Delivering Tailored Technical Assistance and Facilitating a Learning Agenda
3.3		Strengthening Project Management through Support of the Implementing Institutions and Multisectoral Collaboration
4.1	Contingent Emergency Response Component (CERC)	Contingent Emergency Response Component (CERC)

1.4 Regional Health Context and project development

The proposed project is aligned with the World Bank Group Country Partnership Framework (CPF) for Malawi, discussed by the Board of Executive Directors on April 2, 2021 (FY21-25, Report No. 154505-MW). The project also consolidates efforts of the World Bank and development partners to not only provide relief but strengthen health systems to be more resilient

to economic shocks, climate-related disasters and public Health emergencies. The program is also aligned with the Government's increased prioritization of pandemic prevention, preparedness and response (PPR) following the COVID-19 pandemic. The proposed project is also well aligned with the Malawi 2063 as well as the national plans and policies on health and gender. Additionally, the proposed project is fully aligned with both the adaptation and mitigation goals of the Paris Agreement, and Malawi's updated Nationally Determined Contribution (NDC, updated 2021).

1.5 Country Health Context

Over the past decade, Malawi has made strides to improved health status of its population. Average life expectancy has increased over the last 10 years mainly because of robust implementation of Human Immunodeficiency Virus (HIV) and maternal and child health programs; the maternal mortality ratio declined from 439 per 100,000 live births in 2015 to 349 per 100,000 live births in 2019[3]. Child mortality declined from 63 per 1000 live births in 2015 to 42 per 1,000 live births in 2021, and infant and neonatal mortality rates have also declined. HIV related mortality has been more than halved over the last decade.

Despite these gains, Malawi is still lagging in certain health outcomes. About 40 percent of Malawi's children below age five are stunted and the adult survival rate remains below regional and peer country averages. Non-communicable diseases (NCDs) and injury mortality have been on the rise, accounting to over 40 percent of mortality in Malawi. The adolescent fertility rate, estimated at 132 births per 1,000 women aged 15-19 in 2018, is higher than the regional and peer country averages. Similarly, the country's total fertility rate of 4.27 is one of the highest in the region.

Additionally, Climate change debilitates Malawi's health system and expands the burden of climate sensitive diseases, particularly vector and water borne diseases. Malaria, which is endemic is a leading cause of death in children. The disease is experienced in at least 95% of the parts of the country. Other Diseases related to climate change and extreme weather events include Cholera, malnutrition conditions, injuries due to damage to infrastructure and to humans directly. Other challenges which the country is facing is related to gender inequalities which persist in Malawi's health sector, where women and girls face significant challenges in accessing health services compared to men. This disparity is evident in the considerable time women spend seeking routine health services, limiting time spent on other meaningful activities. Moreover, cultural and gender-specific norms hinder young women's participation in sexual and reproductive health services. [4] Moreover, female health workers face multiple cultural and logistical hurdles to be recruited while women in managerial and technical roles within the health system are less likely to be trained, employed and promoted than their male counterparts. Risk communication and community

[3] Project Appraisal Document for Malawi Health Emergency Preparedness, Response and Resilience Program Using the Multiphase Programmatic Approach (P505187)

[4] PAD for the Malawi Health Emergency Preparedness, Response and Resilience Program Using the Multiphase Programmatic Approach (P505187)

engagement (RCCE) efforts remain weak in Malawi. Women have less access than men to both traditional and digital technologies used for communication during health emergencies.

1.6 Organization of Malawi's Health Care System

The health service delivery system in Malawi is organized at three levels (primary, secondary, and tertiary), which are linked by a referral system. The services are delivered through a network of public, Non-Governmental Organizations (NGOs), Private-not-for-Profit, and Private-for-Profit providers. Health services in the public sector are free-of-charge at the point of use. As of 2019, there were a total of 1,098 health facilities in Malawi, of which 52 percent were owned by the government, about 23 percent were Private-for-Profit and the remaining 25 percent were private-not-for-Profit, NGO, and institutional clinics (e.g., military). The public health facilities deliver nearly 60 percent of health services and directly employ over 70 percent of the health workforce. The Christian Health Association of Malawi (CHAM) owns 15 percent of health facilities and delivers about 35 percent of health services.

CHAM complements public facilities through a memorandum of understanding (MOU) or Service Level Agreements (SLAs) with the MoH. The MoH provides oversight to the health sector in Malawi and its specific functions include strategic planning, policy making, standards setting, technical support, monitoring and evaluation, quality assurance, resource mobilization, and international representation. Five Zonal Quality Management Offices (QMOs) are an extension of the central level (Ministry of Health) and provide technical support to districts. The MoH is also responsible for the oversight technical backstopping of central hospitals. At the district level, in line with the decentralized structures, District Councils oversee the management, planning, execution, and evaluation of the health District Implementation Plans (DIPs) and budgets.

The council's secretary has several directorates of which one is for Health and Social Services, whose director heads the District Health Management Team (DHMT). The functions of the DHMT include managing all public health facilities at district level and directing provision of both primary and secondary level health services at the district level.

In all the health facilities, there are many types of waste which are produced which required appropriate management. However, there are several challenges faced by the facilities in terms of waste management which include inadequate resources, no designated officer or committee for waste management at the facility level, lack of knowledge and training in waste management, increased occurrence of new pandemics which do not have proper guidelines in terms of infection control among others. This project will also bridge the gap that is existing in terms of infection control and waste management in Malawi.

1.7 Existing Medical Waste Management System

The Ministry of Health has developed a National Health Care Waste Management Policy and draft Healthcare Waste Management Guidelines in 2024. Most healthcare facilities are aware of this policy and these guidelines. However, the guidelines have not been finalised. Additionally, there

is a need to provide adequate resources, training and monitoring to ensure good practices related to healthcare waste management are implemented and adopted. Health care waste management guidelines were developed with the background that there is significant waste produced from different public health care facilities. In an effort to improve infection control and aste manage in the healthcare facilities, the ministry of health has done a number of activities for example training of support and technical staff on healthcare waste management and infection control, conducting supportive supervision to the facilities, training of incinerator operators and maintenance officers in operation and maintenance of incinerators, supporting the districts with fuel energy for incineration, procurement of incinerators, procurement of PPEs, waste trolleys and waste collection bins.

Despite these efforts being undertaken, healthcare waste management in hospitals and health care facilities remains a challenge. Most of the country's health facilities lack proper or adequate waste management facilities and standards for source separation, collection, reuse, recycling and disposal of health care waste. The SATBHSS and COVID 19 project realised that the management of healthcare waste in the facilities has been hindered by the deficiency in the institutional and legal framework, attitude of health workers and waste handlers, little or no resources allocated on healthcare waste management, inadequate equipment, PPEs, waste collection equipment, bags, inadequate IEC and community involvement and inadequate capacity by the healthcare workers. The two projects managed to address some of these challenges but there is a lot to be done on the same.

Inadequate management of health care waste pose risks to medical staff and public providing and accessing these crucial services. Some health facilities have been reported to have incinerators, collection bins and burial pits. Poorly managed incinerators could be a serious source of air pollution and safety risk especially sharps, infectious waste are not completely burnt. Burial pits have been observed to play a role as dump sites for all infectious waste. These pose a threat to public health and the environment. Most healthcare facilities and councils have no proper regulated disposal sites for health care waste, except a few private firms which have approved incinerators.

1.8 Rationale and Objectives of the ICWMP

The Infection Control and Waste Management Plan (ICWMP) serves as an essential plan designed to reduce the risks associated with healthcare-associated infections and the mishandling of healthcare waste. Due to the inherent dangers that come with healthcare activities, it is critical to implement standardized measures for infection prevention and effective waste management. The ICWMP has also been developed in line with the Environmental and Social Commitment Plan for the project, Environmental and Social Management Plan, Stakeholder engagement plan, and the project implementation manual.

1.9 Objectives of the ICWMP

The main objective of the ICWMP is to prevent and/or mitigate the negative effects of medical waste on humans and the environment thus ensuring safer management to prevent spread of

infection and reduce exposure of health workers, patients and public risk from medical waste. The plan presents a holistic approach to manage healthcare waste throughout program lifecycle, and it encompass the whole waste management cycle.

The ICWMP is designed to be implemented by a diverse group of stakeholders, including Healthcare Facilities, Community, Project Teams, Ministry of Health (MoH) and its Partners.

The recommendations in the ICWMP have been based on the most current evidence from reputable sources, including the World Health Organization (WHO), World Bank Environmental and Social Framework (ESF) and adapting local policies and regulations to fit the specific contexts of the healthcare facilities involved.

The implementation of the ICWMP is a crucial move towards ensuring the safety and well-being of health clients, healthcare workers, and the wider community. By following the guidelines laid out in the plan, healthcare facilities can significantly diminish the risk of infection transmission and manage healthcare waste effectively, contributing to a healthier environment and community overall.

1.10 Scope of the ICWMP

The scope of the assignment involves the development of an Infection Control and Waste Management Plan (ICWMP). Specifically, the scope aims at the following.

- Specifying measures to be implemented to prevent the spread of infections
- Strategies to enhance infection surveillance and preparedness to outbreaks
- Provide measures for health waste segregation and safe disposal
- Provide training requirements and education for the key stakeholders
- Provide legal framework to ensure compliance with regulations and standards
- Proposed actions for improvement of hygiene, and public safety
- Propose sustainable and efficient resource management and utilization

Chapter Two: Policy, Legal, Administrative and Operational Framework

This chapter explores the linkages of relevant national policies and legal frameworks with the MHEPRR project. The below sections summarise the implications of these policies and legislations on the project and its activities.

2.1 Policy framework

2.1.1 National Health Policy, 2018

The National Health Policy provides policy direction on key issues that are central to the development and functioning of the health system in Malawi. The Policy places measures aimed addressing the socio- determinants for health which among others includes air pollution from incineration. The management of healthcare waste to be generated will ensure that they comply with the policy needs on addressing the socio –determinants.

2.1.2 The National Environmental Policy, 2004

The Policy promotes adherence to sound management of the environment and natural resources through promotion of sustainable social economic development against sound management of the environment and natural resources such as water, soil, flora and fauna. This project will not undertake any construction related activities. However, some activities will have the potential to generate waste which may have impacts on the environment. MOH and other project partners will facilitate implementation of the ICWMP to prevent and minimise the impacts of healthcare waste on the environment.

2.1.3 National Sanitation Policy, 2006

The Policy provides guidelines and an action plan for access to improved sanitation, safe hygienic behaviour, recycling of solid and liquid waste practices for healthier living and better environment. Through the provision of WASH commodities and WASH services at health facilities in remote and climate prone areas, the project has aligned itself to this policy.

2.1.4 The National Gender Policy, 2015

The Policy strengthens gender mainstreaming and women empowerment at all levels in order to facilitate attainment of gender equality and equity in Malawi. The project will ensure that it also provides employment opportunities to capable women. The project has aligned itself to the policy through increased participation of women in the human resource development, capacity building, decision making and the inclusion of all stakeholders across gender in the implementation of the project activities.

2.1.5 Infection Prevention and Control Policy, Revised 2018

The Policy stipulates that all health care facilities (public and private) in Malawi shall have an active infection prevention and control (IPC) program in place; aimed at promoting IPC practices

and surveillance focusing on clients, patients, health care personnel and the environment. As such, this ICWMP is being developed to domesticate and facilitate the implementation of the provisions of the policy.

2.1.6 Decentralization Policy, Amended 2010

The Decentralization Policy Amended 2010, seeks to create a democratic environment and institutions for governance and development at the local level that facilitate grassroots participation in decision making. The project realises that the implementing entities are the councils where the health sector within the council reports to. It will ensure that there is compliance and involvement of local councils in the implantation of the project proposed activities.

2.2 Legal Framework

2.2.1 Public Health Act (1948)

The Public Health Act consolidates the law regarding the preservation of public health in Malawi. It addresses issues regarding infectious diseases and creates institutions for responding to emerging public health challenges. The Project is well aligned and supports the capacity building of healthcare workers, surge staff to ably respond to public health emergences which may impact the health of the public.

2.2.2 Pharmacy, Medicines and Poisons Act (2014)

The Act provides for the establishment of the Pharmacy, Medicines and Poisons Board, the registration and disciplining of pharmacists, pharmacy technologists and pharmacy assistants, the training within Malawi of pharmacists, pharmacy technologists and pharmacy assistants, the licensing of traders in medicines and poisons and generally for the control and regulation of the profession of pharmacy in Malawi and for matters incidental to or connected therewith. The procurement of essential medicines and supplies through the project will ensue that it aligns with the requirements and provisions of the act including capacity building of the pharmacy personnel in order to reduce the incidents of keeping, using and having unused expired drugs.

2.2.3 The Environment Management Act, (2017)

The Act makes provision for waste management and development of subsidiary regulations on waste management include healthcare waste management. It also establishes Malawi Environmental Protection Authority (MEPA) which is responsible for safeguarding the environment. The project realises that there will be need to support the development of guidelines that will enhance adherence to the national standards.

2.2.4 Occupational Health and Welfare Act, (1997)

The Act regulates the requirements for adequate environmental health and safety measures within workplaces. MoH and the project have a duty to ensure the safety, health and welfare of all employees handling healthcare waste. The project aims at integrating the OHS measures through capacity building and on job training of healthcare workers.

2.2.5 Gender Equality Act (2013)

The Act seeks to promote gender equality, equal integration, influence, empowerment, dignity and opportunities for men and women in all functions of society; to prohibit and provide redress for sex discrimination, harmful practices and sexual harassment; to provide public awareness on promotion of gender equality. The project envisages the involvement of women in the response to public health emergences to be given equal opportunity with men, increased women participation and increased number of women who will participate in the trainings, employment and technical epidemiology services including participation in community engagement sessions.

2.2.6 Draft Malawi Healthcare Waste Management Guidelines, 2024

The HCWM Guidelines provide a framework for safe Healthcare Waste Management practices in all Healthcare facilities in Malawi. The management of healthcare waste including capacity development outlined in the project shall follow these guidelines.

2.2.7 Malawi Standards (MS) 615: 2005: Waste within health-care facilities, handling and disposal (code of practice)

The standard provides criteria for segregation, collection, movement, storage and on-site disposal of waste within health-care units. The waste generation and disposal form the provision of health services through the project shall adhere to the Malawi standards stated here in.

2.3 Applicable permits for the project during implementation of the plant

The project will need to comply with the following permits as shown in table 2-1. Mainly the licenses will be required to be sourced by the Ministry of Health which will carter for all the facilities.

Table 2- 1 : Required permits for the project during the implementation of the ICWMP

Regulations/ Standards/ Approvals	Description	Legal Requirements	Issuing Institution	Applicant
Licence for storage and transportation of general waste	Licence to transport and store waste is issued after filling out application forms and payment of fees	Environment Management (Waste Management and Sanitation) Regulations, 2008	Malawi Environment Protection Authority (MEPA)	Ministry of Health

Regulations/ Standards/ Approvals	Description	Legal Requirements	Issuing Institution	Applicant
Licence to store and transportation of hazardous waste	Licence to transport and store hazardous waste is issued after filling in application forms and payment of fees	Environment Management (Chemicals and Toxic Substances Management) Regulations, 2008	Malawi Environment Protection Authority (MEPA)	Ministry of Health

2.4 International Frameworks

2.4.1 WHO Guidelines on Safe Management of Waste from Healthcare Activities, 2014

The guidelines provide for categorization of healthcare waste. This is crucial in the process of management of healthcare waste at healthcare facilities.

2.4.2 EHS General Guidelines (World Bank)

The EHS general guideline section 1 to 4 provides guidance on prevention and control of Environmental, Occupational health and safety, community health and safety, as well as on construction and decommissioning impacts that may occur during new restoration or modification of existing health care facilities. Section 1 of the guidelines covers air emission, wastewater quality, water and energy conservation, and hazardous material management. As some of the MHEPRR project activities may consist of manual labor work activities which either may generate waste or involve handling of waste, Section 2.0 of the EHS general guidance provides some appropriate strategies and recommendations useful to minimize occupational health and safety hazards. It describes the sources of hazards and recommended strategies for the prevention of risks associated with manual labour. Also, community health and safety aspects such as transport of hazardous materials, and disease prevention are covered under Section 3 of the guidelines.

2.4.3 EHS Guidelines for Health Care Facilities, 2007 (World Bank)

The EHS Guidelines for Health Care Facilities provide information relevant to the management of EHS issues associated with health care facilities (HCF), which includes a diverse range of facilities and activities involving general hospitals and small inpatient primary care hospitals. Ancillary activities may include medical laboratories and research facilities and blood banks and collection services. The guideline addresses waste management (including waste minimization, reuse, and recycling; waste segregation strategies; on-site handling, collection, transport and storage; transport to external facilities; and treatment and disposal options), air emissions, and wastewater

discharges from HCFs as well as Occupational Health and Safety aspects for health workers and community health and safety issues. These are reviewed and applied in this ICWMP as appropriate.

Chapter Three: Status of Infection Control and Waste Management in Malawi

This chapter provides the status of infection control and waste management in Malawi, and description of types of waste produced within the facilities.

3.1 Overview of Infection Control and Waste Management in Healthcare Facilities (HCF)

Health Care Waste (HCW) includes all the waste generated within health-care facilities, research centres and laboratories for medical procedures; and includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radio-active materials (WHO, 2014)[5]. This waste carries greater potential for causing infection and injury than any other form of waste due to its contamination state (*Ibid*) and this necessitates its proper handling and management[6] (WHO, 2004). Between 75% and 90% of the waste produced by health care providers is equivalent to domestic waste which is usually called 'non-hazardous' or general health care waste (Figure 3-1).

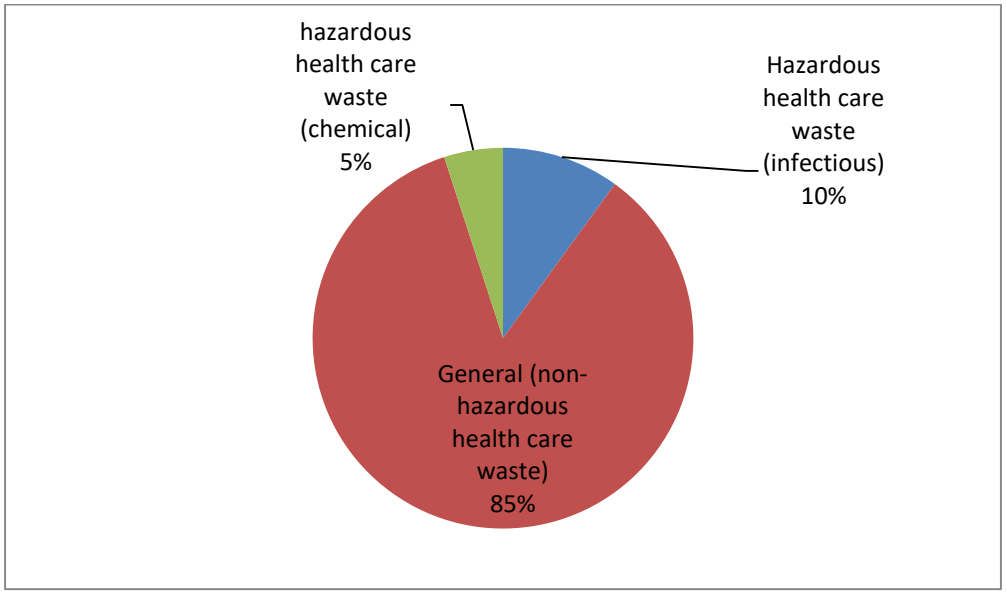


Figure 3- 1 : Typical waste composition in Health Care Facilities (Source: WHO, 2014)

There are generally two major classifications of waste: hazardous and non-hazardous waste. Hazardous waste includes cytotoxic drugs and clinical waste (e.g. sharps and non-sharps) while non-hazardous waste includes biodegradable waste (e.g. kitchen waste or generally domestic waste) and inorganic waste (i.e. waste that is recyclable and can be sold at the market). Table 3-1 shows more categories of waste (hazardous and non-hazardous) according to WHO (2014) classifications and these pose risks for workers and communities including health clients.

Table 3- 1 : Waste Categories which pose risks to workers and communities

Waste category		Descriptions and examples
Hazardous HCW		
1	Sharps waste	Used or unused sharps (e.g. hypodermic, intravenous or other needles; auto-disable syringes; syringes with attached needle infusion sets; scalpels; pipettes; knives; blades; broken glass)
2	Infectious waste	Waste suspected to contain pathogens and that poses a risk of disease transmission (e.g. waste contaminated with blood and other body fluids; laboratory cultures and microbiological stocks; waste including excreta and other materials that have been in contact with patients infected with highly infectious diseases in isolation wards).
3	Pathological waste	Human tissues, organs or fluids; body parts; foetuses; unused blood products.
4	Pharmaceutical waste	Pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals.
5	Cytotoxic waste	Cytotoxic waste containing substances with genotoxic properties (e.g. waste containing cytostatic drugs – often used in cancer therapy; genotoxic chemicals)
6	Chemical waste	Waste containing chemical substances (e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; waste with high content of heavy metals, e.g. batteries; broken thermometers and blood-pressure gauges)
7	Radio-active waste	Waste containing radioactive substances (e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources).
Non-hazardous or general HCW		
Waste that does not pose any biological, chemical, radioactive or physical hazard.		

Hazardous healthcare waste is of primary concern, due to its potential to cause infections, disease or injury. On the other hand, Infection prevention and control (IPC) is defined as the discipline concerned with prevention of the spread of infections within the health-care setting and at community level. IPC are evidence-based practices and procedures that are applied consistently in

health care settings to prevent or reduce the risk of transmission of micro-organisms to health care providers, clients, residents and visitors. Therefore, either at health care or community setting, IPC is concerned with interventions relating to health and environment, which can be divided into 4 parts; Personal (staff) protection; Patient protection; Population (Community) Protection and Environment protection.

According to WHO, about 15-25% of total health-care waste should be infectious waste, and improper handling of health care waste can cause serious health problems for workers, community and environment. WHO reports showed that worldwide, about 5.2 million people (including 4 million children) die each year from waste related diseases. The hazards of exposure to health care waste can range from gastro-enteric, respiratory, and skin infections to more deadly diseases such as HIV/AIDS, and Hepatitis (Babanyara et. al 2013). WHO reported that globally, injections with contaminated syringes caused 21 million hepatitis B infections (32% of all new infections), 2 million hepatitis C infections (40% of all new infections) and 260,000 HIV infections (5% of all new infections). More specifically medical waste has a high potential of carrying micro-organisms that can infect people who are exposed to it, as well as the community at large if it is not properly disposed of. Many of these infections were avoidable if the wastes had been disposed of safely (WHO 2004).

Although treatment and proper disposal of health-care waste reduces risks, indirect health risks may occur through the release of toxic pollutants into the environment through treatment or disposal. For instance, landfills can contaminate drinking-water if they are not properly constructed. Occupational risks exist at disposal facilities that are not well designed, run, or maintained. Furthermore, incineration of waste has been widely practiced but inadequate incineration or the incineration of unsuitable materials results in the release of pollutants into the air and generate ash residue.

Incinerated materials containing chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal content (lead, mercury and cadmium) can lead to the spread of toxic metals in the environment. Dioxins, furans and metals are persistent, and bio accumulate in the environment. Materials containing chlorine or metal should therefore not be incinerated.

The health-care activities will protect and restore health and save lives however, the amount of infectious waste and by-products being generated may cause adverse potential health and environmental impacts. The average distribution on types of medical waste for purposes of waste management planning is approximately 80% non-infectious and 20% infectious such as biological/pathological waste, chemical/pharmaceutical waste and sharp materials.

3.2 Health Care Waste Management in the HCFs

Malawi like other developing countries faces the problem of HCWM. While less percentages of waste could be considered as infectious, this is not the case in many health facilities in Malawi with poorly developed waste-segregation and disposal practices, hence m the larger percentage of

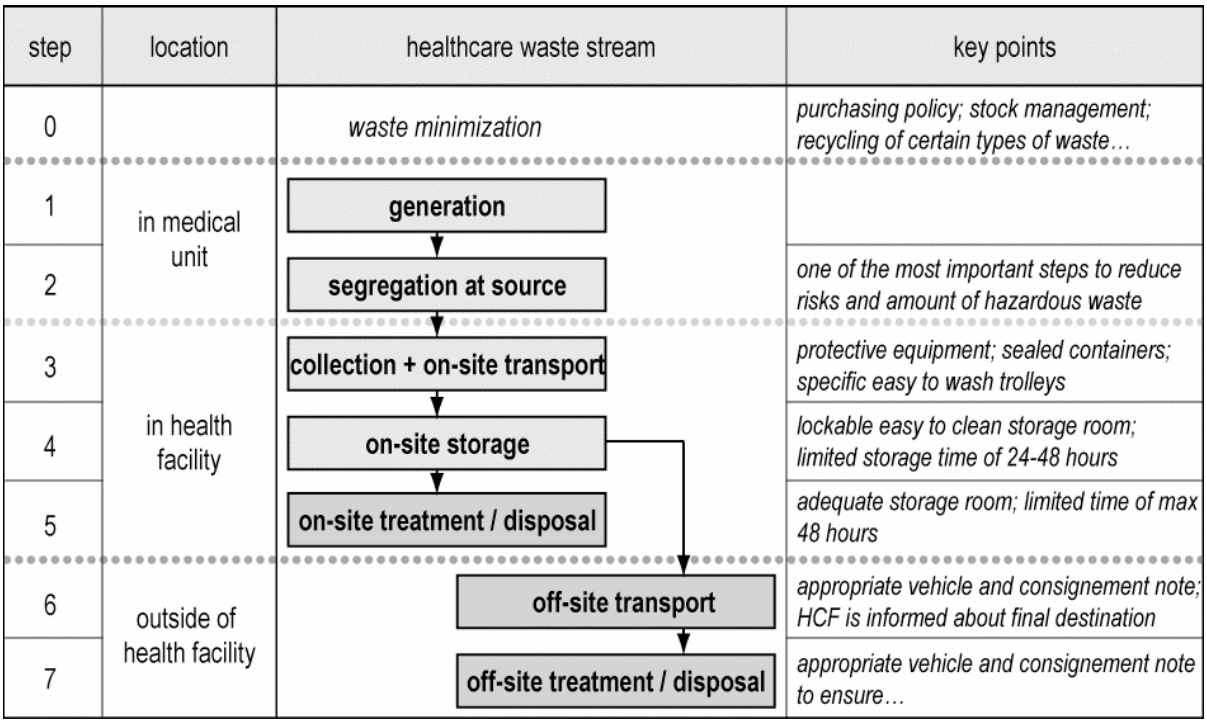
waste would generally be categorized as infectious. The main reason for this is the increased generation of diverse types of healthcare waste due to the multiplication and expansion of healthcare facilities because of population growth, ongoing immunizations and treatment of various conditions including emerging (i.e. Covid-19) and re-emerging communicable and non-communicable diseases. The different types of health care wastes generated from these health care services poses potential health risks to the health workforce, the environment and community at large.

Health care settings produce infectious waste that may lead to Hospital Acquired Infections (HAIs) among health care workers, waste handlers, and patients. HAIs have been a major contributor to morbidity and mortality burden in the developing world. The actual burden of HAI for the national has not been estimated, but for a large central urban hospital in Blantyre, it was estimated at about 11.4%[7]. It is important to note that Covid-19 and multi drug resistant TB and other potential infectious materials (OPIM) pose a great threat to the health workforce and public.

The standard practice in most hospitals in Malawi is that health care waste is separated into three main categories as follows: i) Highly Infectious or hazardous health, ii) Infectious, iii) Sharps and iv) non-infectious waste. However, there are minimum procedures to be followed in management of the medical waste. Table 3-2 presents an overview of the minimal procedures that should be followed to effectively manage HCW from point of generation to point of disposal.

Table 3- 2: Summary for HCW stream

[7] Bunduki, G.K. · Feasey, N. · Henrion, M.Y.R. · et al. **Healthcare-associated infections and antimicrobial use in surgical wards of a large urban central hospital in Blantyre, Malawi: a point prevalence survey**. *Infect Prev Pract.* 2021; **3**, 100163



Source: *Secretariat for Basel Convention & WHO, National Health-Care Waste Management Plan: Guidance Manual. Can also be accessed at www.who.int website*

3.2.1 Health Care Waste Generation

Appropriate handling, treatment, and disposal of waste by type can help to reduce costs and in the same breath serve as safeguard in the protection of public health and the environment. Critical here is the observance of health care waste production with the following being key result areas:

- Waste Generation: Most health facilities generate varying quantities of waste ranging from one health facility to the other in accordance with their patient workload and treatment offered in the health care facilities. However, the facilities are not able to quantify the volume of the amount of waste generated.
- Waste Minimization: Waste minimization is a strategy for sound management of health care waste although most health facilities in Malawi have difficulties in practicing waste minimization or showing any efforts geared towards waste minimization.
- Waste receptacles: The containment of waste from points of generation is critical towards the achievement of sound management of health care waste. Many health care facilities have inadequate waste receptacles; hence the poor management of the health care wastes in Malawian health care facilities.

The following table 3-3 provides a list of public healthcare facilities and estimated generation of healthcare waste.

Table 3- 3: Estimated generation of healthcare waste produced from public healthcare facilities

District	Number of health facilities	Estimated healthcare waste generated monthly (Kgs)
Ntcheu	40	6193
Mchinji	19	1219
Dowa	25	4667
Machinga	23	4305
Mwanza	4	1075
Mzimba South	33	1549
Ntchisi	17	3214
Rumphi	20	1002
Nkhotakota	21	2028
Nsanje	15	2152
Chiladzulu	15	2945
Blantyre	39	1451
Chitipa	14	1230
Mulanje	23	2303
Likoma	4	543
Mzimba North	31	1017
Neno	14	3758
Phalombe	16	2609
Zomba DHO	48	1463
Zomba Mental	1	4074
Zomba Central	1	33027
Dedza	36	1390
Lilongwe DHO	61	2000
Chikwawa	32	3654
Kasungu	36	3990
Mangochi	49	19820
Karonga	22	492
Thyolo	42	7843
Nkhatabay	18	2400
KCH	1	29850
Salima	43	10300
QECH	1	11042
Balaka	17	3400
TOTAL	**734**	178,005

Source: Ministry of Health database

3.2.2 Health Care Waste Handling

Health-care waste management options may themselves lead to risks in human health and environment and no perfect readily achievable solution exists in the management of health-care

waste. Waste, whether generated at smaller rural clinics or larger facilities, can be managed where adequate well-operated infrastructures exist. In order to achieve sound implementation of waste management, most healthcare institutions have adopted the following steps as a strategy for success:

- Waste Segregation Practices: Segregation of waste by type is observed in some facilities in the country which have embraced segregation practices using color -coded bins. Segregation of HCW is done according to the following categories: infectious or clinical waste (hazardous waste), non-infectious or general waste, highly infectious waste, and sharps waste. Use of colour codes for waste containers is low in many facilities. The following colour codes for HCW are provided in the Ministry of Health, Infection Prevention & Wash Guidelines for Malawi
    - Red for highly infectious waste.
    - Yellow for infectious and sharps waste.
    - Black for non-infectious waste.

Careful segregation of waste into different categories helps to minimize the quantities of hazardous waste. Poor segregation and poor choice of technology for treatment and disposal of waste are two problems that exists due in part to inadequate management practices or simply because of absence of adequate provision of waste receptacles.

- Packaging of Healthcare waste: The packaging involves putting waste in colour-coded waste bags. Many facilities in Malawi do not have the required temporary waste storage facilities, hence waste is just kept at a holding area or where health care is being provided without being sealed.

- Labelling: Labelling of waste bags is a recommended practice to ensure each waste category is easily identified, and waste loads can be traced back to their point of generation. The current practice in most health facilities in Malawi is that labelling is rarely done.

3.2.3 Waste Transportation and Storage

Waste Transportation: It is common practice in Malawi that most hospitals and health facilities continue to use wheelbarrows and other improvised transport modes for the transportation of waste within the health care facilities and within its compounds, while only a few of the facilities use standard trolleys mainly in private and CHAM facilities. The use of wheelbarrows and other channels should be discouraged since it leads to spillage of waste. The recommended practice for waste transportation within hospitals should be dedicated trolleys and/or wheeled bins with separate ones for infectious waste to be drawn on paved surfaces and designated routes to waste treatment sites.

Waste Storage: Generally, most health care facilities in Malawi do not have well managed storage areas designated for the storage of waste generated. Mostly the waste is kept at the point of production or left in disused rooms. In some facilities, they do improvise some small room for

waste storage. Other facilities store their waste right beside the incinerators (batch burners) so that its closer to the treatment area. This makes waste collection difficult and not organised within a facility .The facilities shall be advised to designate a room for the temporary storage of the waste to be generated under the project. For the facilities that do not have space for the temporary storage, they should take the healthcare waste direct to the disposal area.

To ensure effective storage, it is recommended that healthcare waste is stored in a restricted area, with a weatherproof covering and on a concreted area where spillages could be visible and managed.

3.2.4 Waste Treatment and Final Disposal

The goal of treating health care waste is to render the waste safe for disposal, therefore it aims at eliminating hazards and exposures. WHO and Stockholm convention guidelines among other related global best practices recommend "prioritizing consideration of alternative waste treatment processes" that do not generate dioxins and furans.

It may be safer for some wastes to be treated or pre-treated on site. Laboratories are uniquely capable of treating some wastes to eliminate hazards or reduce the amount of waste for disposal, thereby cutting costs. However, the technologies are rather sophisticated and capital intensive, requiring elaborate maintenance capacity.

The HCWM training manual for Malawi (2004) recommends the incineration treatment system; ***Incineration***, which when done properly is a highly advanced technology that can adequately treat all types of special healthcare waste. The key parameters of controlled incineration are combustion at a sufficiently high temperature (between 1,000°C and 1,200°C) for long enough time in a combustion chamber with sufficient turbulence and oxygen for complete combustion to be achieved; and problematic gases to be minimized.

Environmental health reports generated by the Ministry of Health indicates that currently over 80 percent of healthcare institutions in the country have incinerators that do not meet the minimum standards (temperature of 1,000°C and 1,200°C) or have literally none and in such situation incineration of medical waste is done in open pits where burning is also not complete (Information from the draft HCWM policy,2020). Destruction of expired medicines and related supplies also poses a serious challenge because of the lack of adequate incinerators constructed for this purpose in the facilities.

In the majority of the health facilities what is available are the low-cost medical waste incinerator called Mechanical incinerators which is recommended for most hospitals and health centres. The waste is manually loaded and de-ashed on a daily basis. A shovel is used to remove the ashes (after cooling down) and disposed of appropriately in an ash pit. It is recommended that all wastes delivered to the incinerator should be burnt within 24 hours. Most of the mechanical incinerators were installed/ built as an emergency preparation for Ebola Virus Disease.

Currently, Malawi under the Ministry of Health has two Medical Waste Incinerators that do meet minimum standards, and these were commissioned in 2020 and were purchased with funds from the GAVI/Global Fund for Health. One of these incinerators is at Queen Elizabeth General Hospital in Blantyre, which is in the southern region of Malawi and the other one is at Kamuzu Central Hospital in Lilongwe (Central Malawi).

Apart from these newly commissioned incinerators, St Gabriel Mission Hospital, which is a Christian Health Association of Malawi (CHAM) facility, has a Medical Waste Incinerator that also meets the minimum standards and has so far been used for disposal of medical waste in the country on a cost-sharing basis. The use of these incinerators requires financial resources to support the logistical aspects of transporting waste generated in various facilities across the country but also on the operational and maintenance costs of these incinerators. Transportation itself requires appropriate vehicles to maintain the safety of both people and the environment through to the incineration site, of which the ideal vehicles are not available, instead the ordinally vehicles are used in off-site waste transportation. Medical waste disposal is even more difficult in Malawi due to the use of disposable needles, syringes, and similar items.

To ensure there is few wastes going for disposal, the Project will encourage adoption of a waste hierarchy approach promoting minimisation, reuse and recycling before engaging into disposal options. Furthermore, the Project could also mainstream some of these waste management options into the procurement guidelines aimed at encouraging the procurement of materials or commodities which can be reused or recycle prior to disposal.

The project will support the maintenance team to conduct regular supervision and preventive maintenance of the existing incinerators to ensure minimum standards of incineration are met. The project shall lobby for resources to be allocated to maintenance team per each facility to support the maintenance and operation of the incinerators.

3.2.5 Occupational Health & Safety

Personal Protective Equipment

Awareness of the danger of disease transmission from infectious waste among health workers in most health facilities raised demand for provision of personal protective equipment (PPEs) to waste handlers. Use of gumboots for protection of waste handlers' feet, and possession of heavy-duty gloves for hand protection is common. The provision of respirators or face masks, overalls, helmets, and plastic goggles for eyes protection is poor in most health facilities. The use of the PPEs is what has not been internalized among expected users. In most waste treatment sites, waste operators have possession of face masks or goggles, however most of them do not utilize them accordingly. There will be an establishment of a facility-based waste management committee to oversee day to day operation of the facility and identifying a waste management focal person to coordinate and oversee OHS at the facility. The committee shall be headed by the Director of Health Services and with the secretary as the District Environmental Health Officer (DEHO).

Overall, adherence to occupational health and safety measures, which include occupational health and safety provisions, employer responsibility, use of PPEs and workers protection and coordination of OHS activities in the management of health care waste is still weak in Malawi.

3.2.5 Capacity Building

Training plans on HCWM: Best practices in Health Care Waste Management require that all healthcare staff receive induction and repeated training on health care waste management. Information was not found on how many health staff have received training in health care waste management per facility, but many have received trainings. However, most staff members who are deployed to handle waste are also engaged in doing other chores within the facilities apart from waste management because there is not designated structure existing at the facility level mainly focusing on waste management. Management of the facility will designate permanent staff who will be equipped with knowledge and skills through in-service trainings and/or orientations to handle waste.

Development of Waste Management Plans: A good waste management plan is a good basis for implementing waste management plans that has allocation of roles, responsibilities and resources. A well-thought-out plan describes the actions to be implemented by authorities, health-care personnel and waste management workers. At the national level, a plan is critical for government to define its intentions to make improvements, and the resources required across the country for successful implementation of environmental safeguards. All central and district hospitals in Malawi have Infection Prevention and Waste Management work plans which will be refined to management plans. 15 district hospitals managed to develop management plans with support from SATBHSSP.

The government and the respective health facilities for the emergency project are expected to develop their health care waste management plans and allocate resources for their operationalization in accordance with the relevant strategic objectives.

3.2.7 Finance and Resources

Most health care facilities do not have the direct vote for the costs involved in managing healthcare waste. In most cases, it is difficult to separate the cost of managing waste; Currently the cost is lumped up with other operational costs. Obtaining resources to purchase bins, bin-liners, funds for personnel deployment and maintenance of health care waste treatment equipment is complicated as these procurements are not prioritised as the health facilities receive very little funding from the Ministry or Councils. To mitigate these financial challenges, it is recommended to have a separate budget code for waste management integrated and costed into the health facility budget. There will be advocacy with the district management teams on the need to allocate enough resources for healthcare waste management. This will ensure the resources are safeguarded to support healthcare waste management.

3.3 Infection Control and Hand hygiene

WHO, Malawi Infection Prevention and Control Policy and Draft Healthcare Waste Management Guidelines notes that management of healthcare waste is an integral part of health facility or hospital hygiene and infection control. Furthermore, the Environment Management Act places responsibility of management of the waste on the producer. Healthcare waste can be considered as a reservoir of pathogenic micro-organisms, which if somehow exposed could give rise to an avoidable infection. If waste is inadequately managed, these micro-organisms can be transmitted by direct contact, by inhalation or by a variety of animal vectors (e.g. flies, rodents, roaches), which could encounter waste.

The Government of Malawi through the Ministry of Health is implementing several activities in making sure that healthcare waste is being managed properly. Through other funding mechanisms the government has procured a lot personal protective equipment for healthcare workers and waste handlers, waste collection bags, capacity building of the health workers and involvement of community structures in the sensitisation and management of the waste.

Standard precautions are the basic level of infection control precautions which are to be used, as a minimum, in the care of all patients. Hand hygiene in both health care and non−health care settings is one of the most important measures that can be used to prevent transmission of some of the infectious diseases. In health care settings, health care workers (HCWs) should apply the WHO's 5 Moments for Hand Hygiene approach before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings. The hospitals were provided with hand wash facilities during the COVID 19 and other ongoing projects, however some are not strategically sited according to the requirement. Hospitals should ensure that there are functioning hand washing facilities with water and soap provided within 5 meters of toilets and any other infectious areas.

Treatment and handling requirements for excreta by implementing WASH practices, particularly hand washing with soap and clean running water, should be strictly applied and maintained because these provides an important additional barrier to transmission of infections.

3.4 Waste Management Guiding Principles for the Project

Improper management of health care waste can cause serious health problem for health workers and other workers along the waste management chain, community and the environment. Medical wastes have a high potential of carrying micro-organisms that can infect people who are exposed to it, as well as the community at large if it is not properly disposed of. Wastes that will be generated from healthcare services could include solid and liquid contaminated waste (e.g. blood, other body fluids and contaminated fluid) and infected materials (used water; lab solutions and reagents, syringes, bed sheets, majority of waste from labs and quarantine and isolation centres, etc.), which requires special handling and awareness, as it may pose an infectious risk to healthcare workers in contact or handling the waste. It is also important to ensure that sharps are properly disposed of.

Infectious waste if not managed properly has the potential to endanger the health of patients, health-care workers, waste-handlers, and the general population. To manage the waste generated from the health facilities the following waste mitigation strategies Figure 3-2 usually referred to as key steps in management of HCWM will be implemented:

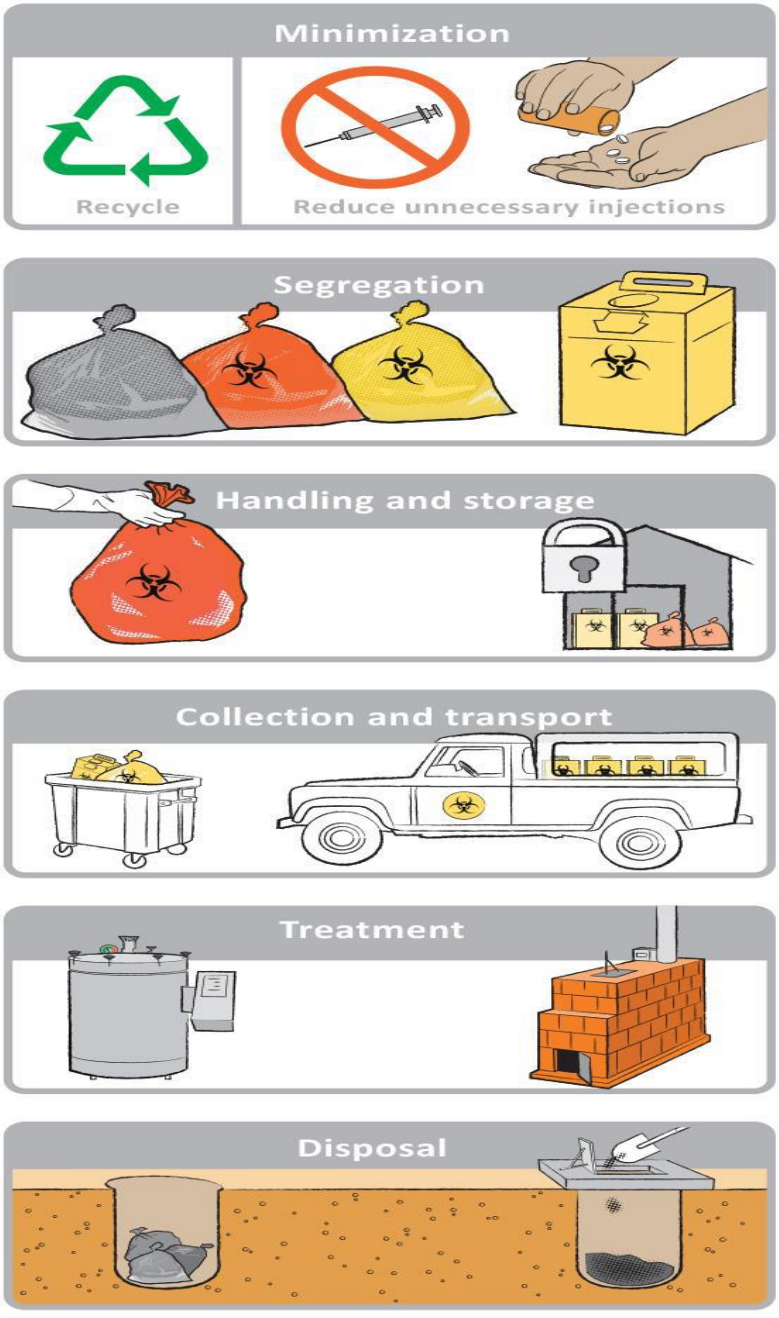


Figure 3- 2: Infectious Healthcare Waste Management

In achieving sound management of waste, a hierarchy of waste management should always be applied. This is a ranking of waste management methods in terms of their 'desirability'. The

hierarchy is based largely on the concept of the 3R's – reduce, reuse, recycle. The most preferable approach is that which produces as little waste as possible, thus minimizing the amount entering the waste stream, taking cautious and very careful attention to the risks involved. Therefore, while applying this to HCWM, ensuring safety of the workers and protection of the environment at every level of control is very critical (Figure 3-3):

Figure 3- 3: Waste management hierarchy

3.4.1 Waste Minimization

The best practice is to ensure that all health facilities (vaccination centers/points, laboratories, isolation, quarantine, treatment centers) should minimize their waste generation to the barest possible minimum amounts. Appropriate plans, strategies and actions should be established to ensure adequate medical waste minimization at source by implementing the following waste minimization strategies:

- Source reduction. Purchasing and supplying materials which are less wasteful and/or generate less medical waste.
- Stock management. Frequent auditing; use of the oldest stock first and checking the expiry date of products during receiving and issuing of commodities.
- Encouraging the use of recyclable products. Using materials that can be reused both off-site and on-site.
- Centralized purchasing, supply of medical goods to ensure the selection of less wasteful materials;
- Source suppliers who may deliver chemicals and pharmaceuticals in small quantities, this will encourage the hospital administration to make purchase in small manageable quantities,

- Ensure good management and control practices especially in the purchase and use of pharmaceuticals; and
- Enforcing a rigorous and careful segregation of the infectious waste at source.
- Segregation of waste at the point of generation. Sorting the waste into different categories helps to minimize the quantities of infectious waste generated.
- Reduction of unnecessary injections to reduce on sharps waste
- Training of relevant staff on waste minimization and benefits especially the medical staff to make changes towards less wasteful clinical practices.

3.4.2 Waste identification, classification and management

In the case of COVID-19 and this emergency project all the wastes generated in care of COVID-19 patients and other related emergency infections like cholera is considered as infectious waste and will be segregated in the yellow bags and adhere to MoH Infection Prevention & WASH Guidelines as well as recommended by WHO Safe management of wastes from health-care activities with the following colour- coding system:

- **Black:** All bins or bags containing non-infectious waste.
- **Yellow:** Any kind of container filled with infectious healthcare waste, including safety boxes.
- **Red:** Any kind of container filled highly infectious healthcare waste.
- **Sharp containers and sharp boxes:** any sharp waste generated from the laboratory and other departments.

According to the Malawi Infection Prevention and Control Policy, the biomedical waste is classified into non-infectious waste which includes paper, cardboard, non-contaminated plastic or metal, leftover food or garden waste, infectious waste which includes Needles, scalpels, auto-disposable syringes, infusion set with needles, broken glass and the highly infectious waste which includes Pathological waste, anatomical waste, sputum containers and specimens, test tubes containing specimen, laboratory waste etc. the management of these waste should follow the guidelines stipulated above and also the draft national healthcare waste management guidelines.

Double layered bags should be used for the collection of waste from isolation and treatment wards to ensure that no accidental leakage occurs from the bags.

The waste generated from treatment facilities and vaccination points, will be segregated and colour coded as outlined below in table 4.

Table 3- 4: Three-bin and safety box system to be used at all health faculties

Type of waste	Area of generation	Color and label	Type of container	Removal frequency	Destination	Responsibility
Highly infectious	Lab	Red, marked "Highly infectious"	Strong leak-proof plastic bag or container capable of being autoclaved	Daily	Incineration Ashpit after treatment	Lab technician
Infectious wastes, Pathological and anatomical	Maternity	Yellow, marked biohazard	Leak-proof plastic bag or container	Immediately	Incineration, placenta Pit	Clinical Officer/ Nurse
Sharps	Lab, OPD, Maternity	Yellow marked sharps	Puncture proof container	Daily	Incineration	Lab, Nurse
Chemicals and pharmaceuticals		Red labelled with appropriate hazard symbol	Plastic bag or rigid container	Weekly	Incineration	Pharmacist
Radioactive wastes		Labelled with radiation symbol	Lead box	Weekly	- Dilute and Disperse. - Delay and Decay. - Concentrate & Contain (Rarely used) - Incineration (Rarely used) - Sanitary land fill - Scrap metals - Recycling - Burying in exclusive sites designated by competent authority	Radiographer

General HCW	Waste from the kitchen, wards and in the offices	Black	Plastic bag	Daily	Refuse pit, sanitary landfill and burning	Housekeeping

3.4.3 Packaging and Labelling of Healthcare Waste

The packaging involves putting wastes in the colour-coded waste bags (bin liners) and label it for easy identification of waste streams and easy tracking back. All waste bags or containers should be labelled with basic information in English language and or in Chichewa (local language). Basic label information should include type of waste in the container, name of the health department, date of collection and, warning of hazardous nature. In general, labelling is important to:

- Identify the source of infectious or date of generation in case of an accident or improper segregation of the waste, ensure that the workers responsible for infectious management handle the different types of wastes safely, ensure that each staff member feels more responsible for what they put into the bag/receptacle.
- Ensure that Medical Departments gather data on the amount of waste produced in each department.

The packaging should be appropriate for the type of waste involved. In order to reduce the risk of exposure to medical waste, stringent packaging protocols including decontaminating the waste containers at point of origin must be adhered to. The following guidelines should be included for packaging sharps and other health care wastes:

- The bio-medical waste should be collected and stored separately by the same common bio-medical waste treatment facility staff prior to handling it. A dedicated collection bin labelled as infectious waste should be used to store waste from the isolation wards.
- At the waste treatment area, prioritize treatment within 48 hours and disposal of waste coming from the treatment and isolation areas immediately upon receipt.
- The inner and outer surface of the containers, bins and trolleys used for storage of infectious waste should be disinfected with sodium 0.5% chlorine solutions.
- There would be special packaging characteristics for some treatment techniques; incineration requires combustible containers while steam sterilization requires packaging material that allow steam penetration and air evacuation,
- Once the waste generated has been containerized/packaged for disposal it must not be able to be exposed again as it is moved from site to site to final disposal.

3.4.4 Waste Collection and Handling

Collection of waste from beneficiary health care facilities is extremely important particularly to avoid over spilling of infectious waste out of collection containers to medical staff and general public; collection should be done promptly and routinely or as often as required. Collection of wastes should be done by approved and trained personnel fully equipped with appropriate PPEs and conveying machinery such as waste trolley and carts. Administrators or managers, health care workers and laboratory staff of health facilities should be actively involved in collection of waste as well as the waste handlers. They should ensure that their containers/bags (Bins/safety boxes and collection receptacles) are never more than three-quarter full before sealing them at their points of

generation. Replacement bags should be made available at each waste collection period. They should also ensure that such collection containers are appropriately labelled as per WHO Health Care Waste Management.

- As a precaution double layered bags (using 2 bags) should be used for collection of waste from isolation wards so as to ensure adequate strength and no leaks.
- Dedicated medical waste collection should be made available by the facility management, to ensure the double-bagged waste bags are disposed of immediately.
- Collect and store biomedical waste separately prior to handling over in case the facility is utilizing the services of an off-site treatment facility. It is important to use a dedicated collection bin labelled as infectious waste to store all infectious waste and keep separately in temporary storage room prior to handing over to authorized Biomedical Waste Collectors; and
- Maintain a separate record of waste generated from isolation, quarantine and treatment areas.

3.4.4.1 Waste Handling Safety Measures

All health care waste handlers should wear appropriate PPE (that is, gumboots, apron, long-sleeved gown, heavy duty gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information, refer to the WHO guidance, Safe management of wastes from health-care activities. Personal Protective equipment should be disposed of accordingly as infectious waste.

When performing procedures where splashing may occur or when infectious medical waste bags or containers may contact more than the worker's hands and wrists, the following medical protective clothing and PPE should be provided in addition to gloves:

- Appropriate protective medical clothing should be of material that does not permit infectious medical waste from penetrating and reaching workers clothes or skin.
- Eye protection, surgical face masks, and face shields when personnel may reasonably anticipate facial exposure to infectious medical waste.

Additionally, immunization shall be undertaken for staff members, as necessary (e.g. vaccination for hepatitis B virus, tetanus immunization and covid-19 immunization).

Sharps containers (i.e., safety boxes) will be placed as close to the point of use as possible and practical, ideally within arm's reach.

Safety boxes will not be placed on a floor or in high traffic areas (corridors outside laboratory rooms or sample preparation rooms) where people could bump into them or be stuck by someone carrying sharps to be disposed of.

Infectious waste bins should be covered before collection. It should be cleaned and disinfected with 0.5% chlorine solution after emptying and before reuse.

3.4.5 Waste Storage

There will be designated multiple waste storage area designed for different types of wastes with appropriate design and capacity to store the generated waste and be classified into internal and external. Consideration for storage shall be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. The storage place must be identified depending on the type of waste. WHO guidelines provide key recommendations for storage facilities of health care waste which includes: i) the storage area should have a hard-standing floor with good drainage that allows easy cleaning and disinfection, ii) adequate water supply and supply of cleaning equipment and PPE for staff, iii) easy access by staff handling the waste and lockable to prevent unauthorized entry of persons, iv) should be away from any food preparation areas and patients' wards.

The following rules will be observed for proper storage of infectious waste:

- Initial packaging and storage should take place where infectious waste is generated.
- Medical waste from isolation/quarantine areas should be pre-treated or decontaminated to reduce the microbial load,
- Treatment processes methods may include autoclaving, incineration, chemical disinfection, grinding/ shredding/disinfection methods,
- Storage of waste shall then be moved to a temporary on-site storage location that is secure and completely closed or lockable,
- The facility should have earmarked segregation points, as close to the generation points of infectious waste as possible.
- The facility should ensure availability of good quality and adequately sized containers for waste segregation and on-site storage. These should preferably be thick plastic and should be lined with non- chlorinated plastic liners, refer to additional information in WHO water, sanitation, hygiene and waste management for COVID-19 and WHO Safe management of wastes from health-care activities.

Internal storage is the temporary placement of waste at the point of generation before transfer to external storage points. A temporal storage location for the infectious waste should be designated within the health-care facilities, PoE, isolation and quarantine areas and laboratories. External storage refers to the transit point where waste is stored after removal from primary storage to the time it is collected and transported for treatment and final disposal. External storage location should be isolated and stored in the larger containers found near the waste treatment facilities awaiting treatment. Infectious waste should not be stored for more than 48 hours after generation before treatment.

To ensure infectious waste is kept separately, the central storage receptacles for each color-coded bag should be placed in similarly color-coded receptacles. This waste should be pre-treated (autoclaving, chemical treatment) before being transported to final treatment point.

3.4.6 Transportation

Consideration for transportation will be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. Transportation is classified into On-site transport and Off-site transport, the waste generated from HCF is treated and disposed both at (on-site) and also there shall be off-site transport**.** On-site transport involves conveying of wastes from the various points of generation to a temporary storage location also within the same area. Waste transportation within hospitals should be done by using dedicated trolleys with separate ones for infectious waste to be drawn on paved surfaces to waste treatment sites.

3.4.6.1 On-site Transportation

On-site transport should take place during less busy times whenever possible. Set routes should be used to prevent exposure to staff and patients and to minimize the passage of loaded carts through patient care and other clean areas. Depending on the design of the health-care facility, the internal transport of waste should use separate floors, stairways as far as possible. Regular transport routes and collection times should be fixed and reliable. Transport staff should wear adequate personal protective equipment, gloves, strong and closed shoes, overalls and masks.

Hazardous and non-hazardous waste should always be transported separately. In general, there are three different transport systems; the following should be adhered to when carrying out On Site transportation.

- Waste transportation trolleys for general waste should be painted black, only be used for non-hazardous waste types and labelled clearly “General waste” or “Non-hazardous waste”.
- Infectious waste should not be transported together with other hazardous waste, to prevent the possible spread of infectious agents. Trolleys should be coloured in the appropriate colour code for infectious waste (yellow) and should be labelled with an “Infectious waste” sign.
- Waste should never be transported by hand even if the distance is short due to risks of accident/exposure to infectious material,
- Other hazardous waste, such as chemical and pharmaceutical wastes, should be transported separately in boxes to central storage sites.
- The collected waste should not be left even temporarily anywhere other than at the designated storage room.
- Containers should be covered with lids during storage and transport.

3.4.6.2 Off-site Transportation

During the transportation of waste outside the health facility the following safety precautions should be included: -

- Off-site transportation of waste should comply with WHO guidelines.
- Single-bagged waste and containers of sharps and liquids should be placed within a rigid or semi rigid container such as a bucket, box, or carton lined with a plastic bag.
- When transporting plastic bags of infectious waste, care should be taken to prevent tearing of the bags.
- Infectious waste should not be compacted before treatment.
- Outside selected HCFs, infectious waste should be transported in closed, leak-proof, rigid containers.
- The transportation should be properly documented, and all vehicles will carry a consignment note from the point-of collection to the treatment facility.
- Staff should be fully aware of emergency procedures for dealing with accidents and spillage.
- Recycling of waste MUST be avoided to prevent human contact with infectious agents.
- Landfill sites with informal waste picking shall need increased education awareness, management and security.

Vehicle requirements: Off-site transportation of infectious waste should follow i) the WHO guidelines for the vehicle requirements for transporting infectious waste for both the Pick Up and Truck ii) carry adequate supplies of protective clothing, waste bags, cleaning tools and disinfectants in case of spillage iii) internal finish of the vehicle should be good to allow for ease in cleaning and disinfecting the vehicle after use; It is the duty of the waste generator to clean and provide the PPEs to its staff conducting the disinfection using chlorine after use. The facilities should identify a space to be used as washing bays for the vehicles and these should be connected to the main sewer system of the facility for safe disposal of the contaminants.

Labelling of the transport vehicle: The transport vehicle (*either for the project or Project Partner or private waste collector*) should be labelled according to the type of waste that is being transported. The Ministry has procured waste transportation vehicles to be centrally located in all the regions and these will be used for the transportation of the waste generated. However, the transportation of the waste is not done daily and mostly is done once a week per facility, hence the waste ready for disposal after following waste management hierarchy will be temporarily stored at the designated room. The waste will be labelled as per United Nations classification of the waste. Before sending hazardous health-care wastes off-site, transport documentation (commonly called a “waste tracking note”) should be prepared and carried by the driver with the following information: i) waste classes ii) waste sources iii) pick-up date iv) destination v) driver name vi) number of containers or volume vii) Receipt of load received from responsible person at pick-up

areas. On completion of a journey, the transporter should complete a consignment note and return it to the waste producer for filing.

3.4.7 Waste Treatment and Disposal Methods

Waste Treatment: The project will adopt the World Health Organization (WHO) waste treatment techniques which minimize the formation and release of chemicals or hazardous emissions. In general, proper treatment and disposal of healthcare waste is necessary to ensure that its impact on the environment and human health is minimized or eliminated. Among all the current existing technologies for the treatment and disposal of infectious waste, the most appropriate technology shall be applied, and this should be the safest, reliable, affordable, and sustainable taking into considerations technical, human, financial and available infrastructure and resources (power and fuel) available. Foremost, the technology so chosen should be able to guarantee minimization of the immediate public health risks associated with infectious waste management as well as with the lowest negative impact on the environment.

There are several methods appropriate for infectious waste treatment, depending on the type of healthcare waste material. These treatment methods shall include one of the following options or combination of options: steam sterilization (autoclaving), incineration, thermal inactivation, gas/vapor sterilization, chemical disinfection, shredding, maceration, and sterilization by radiation, or electromagnetic radiation. In Malawi, incineration and chemical disinfection will be used with 1% chlorine solution

All biological wastes from health Care facilities (isolation and quarantine centres) should be decontaminated and marked as "Treated Biohazard Waste" prior to disposal in designated containers for treated infectious waste. HCFs, Isolation & Quarantine Centres Infectious Medical Waste should be handled in the following ways:

- Workers shall be provided with adequate PPEs, including three (3) layer masks, splash proof aprons, gowns, nitrite gloves, gumboots and safety goggles.
- All PUI/PUM related waste should be double bagged, "swan neck" tied and the outside sprayed with a 0.5% chlorine disinfectant solution (1% household bleach solution).
- If dedicated medical waste collection is available, then the double-bagged waste should be disposed of immediately.
- The surface of containers/bins/trolleys (inner and outer) used for storage of waste should be disinfected with 1% Sodium Hypochlorite Solution.

3.4.7.1 Incinerator control method

Proper design and operation of incinerators should achieve desired temperatures, waste residence times inside the furnace, and other conditions necessary to destroy pathogens, minimize emissions, avoid clinker formation and slagging of the ash (in the primary chamber), avoid refractory damage destruction, and minimize fuel consumption. Good Combustion Practice (GCP) elements also should be followed to control dioxin and furan emissions.

If existing on-site incinerators are used, mitigation measures will be taken to control emissions to air in line with WBG EHS guidelines for healthcare facilities and WHO Safe management of wastes from health-care activities. In the absence of an onsite incinerator, the generated waste will be transported to the nearby incinerator.

The good practices include:

- Waste reduction and segregation to minimize quantities of waste to be incinerated
- A clearly described method of operation to achieve the desired combustion conditions and emissions; for example, appropriate start-up and cool-down procedures, achievement and maintenance of a minimum temperature before waste is burned, use of appropriate loading/charging rates (both fuel and waste) to maintain appropriate temperatures, proper disposal of ash and equipment to safeguard workers
- Periodic maintenance to replace or repair defective components
- Improved training for operators and management including the availability of an operating and maintenance manual, visible management oversight, and regular maintenance schedules
- Ensure provision of well sited ash pits to properly dispose of contaminated ash from incineration
- The incinerator housing should have adequate water supply and provision of sanitation facilities (toilets and wash areas) for use by the staff and

Caution

Due diligence of existing incinerators will be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended. Health and safety provisions should be made available at the incinerator's facilities including fire extinguishers, sand buckets, first aid kits.

Waste Disposal: Final disposal of the non-hazardous healthcare waste and residues or by-products from the treatment of waste will be disposed of in the following ways among others;

- Burial in pits: Infectious waste pits, placenta pits, ash pits.

Please note that incineration is not a disposal method because the ash residue has to be disposed either in a protected ash pit or municipal landfill.

3.4.8 Liquid Waste Generated Treatment and Disposal

Liquid contaminated waste (e.g. pathological sample, blood, faeces, urine, other body fluids and contaminated fluid) from healthcare facilities requires special handling, as it may pose risks to healthcare workers who contact or handle the waste. Typically, a system of sewer pipes linked to form a sewerage system should collect wastewater from around a facility and carry it below ground to the facility sewer dams. with disinfectants such as 1% chlorine solution. Considering the

challenges of few developed liquid waste treatment facilities mainly in cities and few councils, most of the health facilities possess septic tanks. The liquid waste will find its way into the utility sink drain and/ flushable toilets and the sink or toilets rinsed properly

3.4.9 Managing Blood / Body fluid Exposure

Persons including HCWs with percutaneous or muco-cutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected or confirmed infectious disease, should immediately and safely stop any current tasks, and leave the patient care area.

Safely take off PPE according to the steps in the procedure room.

- Treat affected exposed area:
- wash the affected skin surfaces or the percutaneous injury site with soap and water
- Irrigate mucous membranes (e.g. conjunctiva) with copious amounts of water or an eyewash solution, and not with chlorine solutions or other disinfectants.

Immediately report the incident to the chief of unit, IPC focal point (following hospital exposure procedure) as soon as the HCF staff exit the unit.

Exposed persons should be medically evaluated for:

- infectious disease (ID) (of isolated patient)
- other potential exposures (e.g., HIV, HBV, HCV) if sharp/needle-stick injury

Exposed persons must receive follow-up care, including:

- fever monitoring, twice daily period of recording symptoms will depend on the ID, and
- Counselling and psychological support.

Immediate consultation with an expert in infectious diseases for any exposed person who develops fever, symptoms after exposure.

If fever appears and other symptoms, isolate HCF staff, and follow procedure for ID suspected until a negative diagnosis is confirmed, Or

People suspected of having infected should be cared for/isolated, and the same recommendations outlined in this document must be applied until a negative diagnosis is confirmed.

Conduct contact tracing and follow-up of family, friends, co-workers and other patients, who may have been exposed to ID virus through close contact with the infected HCW/ staff.

Chapter Four: Emergency Preparedness and Response (EPR)

The purpose of this section is to provide emergency response for the healthcare facilities (vaccination centres, hospitals, PoE, isolation & quarantine centres and laboratories) with regard to the potential threat associated with both novel pathogens identified (COVID-19, Cholera, diarrhoea) and other non -COVID - 19 risks that could affect Health care Facility operations (including risks to workers and patients and on operation of waste treatment and disposal options). Emergency incidents occurring in an HCF may include spillage, occupational exposure to infectious materials or radiation, accidental releases of infectious or hazardous substances to the environment, medical equipment failure, and fire. These emergency events are likely to seriously affect medical workers, communities, the HCF's operation and the environment.

Most of the selected HCF (Covid-19 vaccination centers, PoE, isolation / quarantine areas and the laboratories) have been in operational offering community health care services and handling infectious diseases but there is no such event has occurred; the probability of negative event is very low.

4.1 Emergency Response Plan for Waste Treatment Facility

In the event that an emergency situation occurs in which the activities at the waste treatment facility (this could be at a healthcare facility or private waste treatment facility) poses a threat to the public's health as well as environmental contamination, i.e., fire explosion, equipment failure the following need to be addressed immediately:

- Identify the cause of emergency;
- Call for the internal support from the responsible Senior Supervisor;
- Notifying other the workers and surrounding residents to take necessary protective measures according to the nature of the incident;
- Liaise with the senior management to organize the evacuation of the clients including patients, guardians, children, staff and residents to safety, and determining the means of evacuation according to the weather and geographical conditions and the population density;
- Set up the emergency shelter outside the safety boundary of the incident site;
- The responsible entity in the emergency environmental incidents should take immediate actions to control or cut-off the source of pollution, taking all possible measures to control the situation, in order to prevent the secondary pollution and the derivative incidents;
- The rescue team from the facility, private entity should be organized immediately if necessary, to reduce the casualty and property loss; and
- Individuals in the contaminated area should be evacuated to safety, and irrelevant individuals should be barred from the area.

4.2 Termination of emergency

The emergency for the situations above that meet the following requirement is qualified to be terminated:

1) The scene of incident has been under control, and the conditions for the incident to occur are removed.
2) The leakage or release of pollution source has been limited within a stipulated scope.
3) The hazard caused by the incident has been thoroughly removed and cannot cause any new incident.
4) It is not necessary to continue to adopt professional emergency disposals at the incident site.
5) Necessary measures have been taken for protecting the public from any secondary danger.
6) The hospitals shall liaise with the councils in management of the potential medical waste which will be dumped in the approved council's dump sites.

Chapter Five: Institutional Arrangement, capacity building and staffing

This chapter provides a description for the implementation arrangement of the ICWMP, staffing within the facilities and the coordination amongst the implementing agencies.

5.1 Institutional arrangements

The MoH is the main implementing agency for the Project and has the Environmental and Social Standards Specialist as part of the team to oversee the implementation of the project activities and ensure compliance with the ICWMP as a safeguard instrument and part of World Bank ESF requirements.

The specialist will provide supportive role by working with the district healthcare waste management focal persons, the WASH coordinators, Infection prevention and control focal persons who directly work with facilities.

The ICWMP will be disseminated and implemented by the PIT -under Department of Planning and Policy Development with support from the Directorate of Preventive Health Services (EHU), healthcare facilities, quarantine, isolation and treatment centres implementing components of this project.

At the National level institutional responsibility for implementation of safeguard instruments will rest with the PIT in MoH. The PIT has an Environment and Social Safeguards Specialist who will support the Medical Waste Management Specialist in project implementation and monitoring of project activities as well as adherence to other environment and social due diligence requirements. The implementation arrangement has been shown in Figure 5-1.

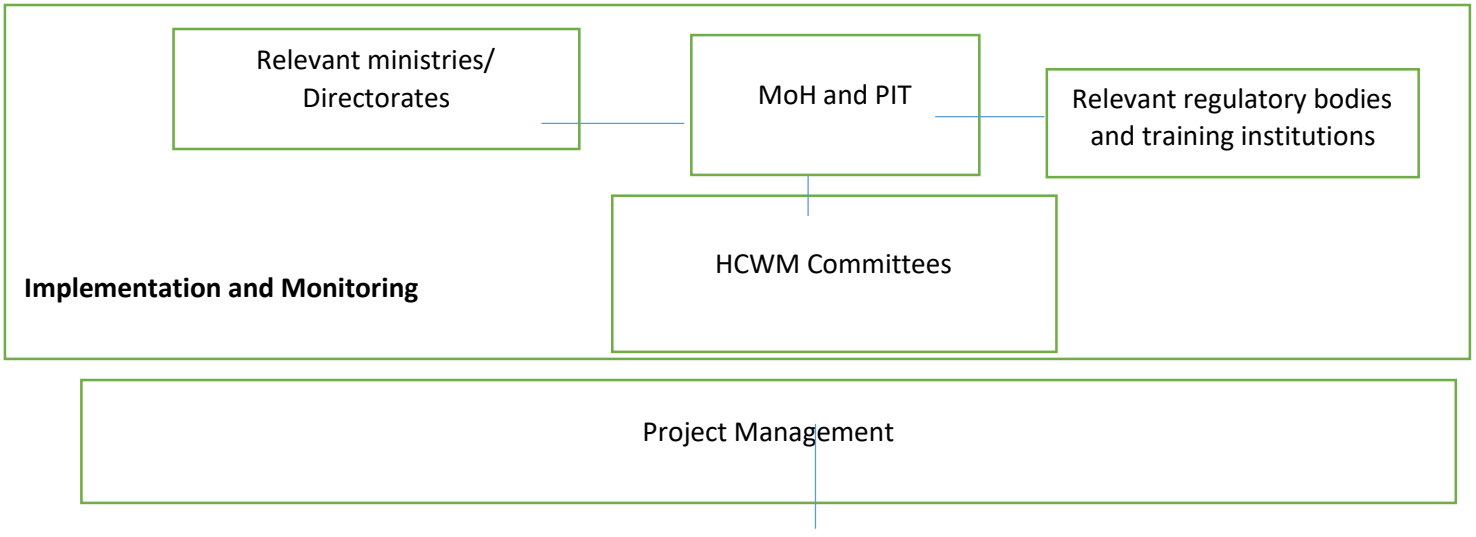


Figure 5- 1: Implementation arrangements of the ICWMP

Monitoring and reporting of activities by the PIT will be continuous to ensure adherence to set specifications and safety to people and the environment. The Bank will provide project implementation support and would base environmental supervision on the Environment and Social Commitment Plan and other safeguard instruments developed to support the environment and social due diligence for activities financed under the project.

Capacity on the content and application of the ICWMP will be built at all levels and be applied to all national referral facilities and referral laboratories targeted by the Project. The respective project beneficiary facilities will be required to prepare site specific ICWMP following the template provided in Annex I and will be responsible for day-to-day supervision on implementation of the mitigation measures.

Part of improving HCW management involves clarifying who is responsible for what functions and identifying the fields of competencies of each institutional actor involved in this process. The roles and responsibilities for the different stakeholders as indicated by Ministry of Health Malawi Health Care Waste Management Guidelines, shall include responsibilities shown in table 5-1.

Table 5- 1 : Responsibilities of responsible agencies during the implementing ICWMP

INSTITUTION NAME	ROLE
Ministry of Health (MoH)	• Formulation of Policy and guidelines, dissemination, implementation and review. • Defining goals, objectives, strategies, interventions and quality assurance mechanisms of HCWM. •Guiding and monitoring implementation of the HCWM •Providing technical expertise, guidance and coordination of the plan •Creating awareness and Providing in-service training of health staff •Establishing HCWM database for monitoring and evaluation (M&E) • Providing technical support to faith-based and private facilities to ensure effective implementation of HCWM programs • Enforcing law and regulation in HCWM within public, CHAM and private health facilities in collaboration with relevant institutions • Advocacy for resource mobilization including human resources and awareness and integrating HCWM in training curricula
Ministry/department responsible for Water Development and Irrigation	•Provision of safe water sources that facilitate HCWM
Malawi Bureau of Standards	•Developing standards related to HWCM •Monitoring compliance of standards in collaboration with regulatory authorities.

Ministry responsible for Local Government and Rural Development	•Implementation of HCWM •Formulation of by-laws on HCWM
Regulatory Bodies (MCM, NMCM, PMRA, MBS)	•Integrating HCWM in their routine inspections of health facilities •Providing input in curriculum development for HCWM by health institutions in Malawi •Enforcing law and regulation in HCWM practices in all health facilities •Mobilising resources for routine inspection of health facilities. •Inspection of health facilities to ensure compliance with HCWM guidelines and standards • Advocacy for good HCWM practices and implementation of standards
Malawi Environmental Protection Agency	•Approval of the ESIA and ESMPs for the sub-projects •Integrating HCWM in the environmental waste management guidelines. •Monitoring compliance/enforcement of environmental laws and regulations in health facilities including issuance of licences for waste handling ,transportation and storage
Health Training Institutions (Tertiary Institutions)	• Developing and incorporating HCWM curriculum in collaboration with EH Department. • Conducting pre-service and in-service training for health workers in HCWM.
Health facilities	• Participate in HCWM training activities • Supply staff with PPEs • Implement HCWM guidelines • Allocate financial resources for HCWM • Implement HCW management plan • Compliance with the set standards and regulations.

Multilateral and Bilateral Agencies	• Provision of technical and financial assistance for HCWM • Participate in inter-agency activities concerning HCWM
Local Authorities	• Create awareness on HCWM • Implement HCWM with emphasis on proper land filling • Participate in training, monitoring and evaluation • Integrating HCWM in the Council's by-laws • Implementing HCWM with emphasis on proper landfill • Enforcement of by-laws
Non-Governmental Organisations in the Health Sector	• Mobilising financial resources for HCWM. • Advocating for proper treatment and disposal of HCW. • Sensitise communities
National HCWM Multi-sectoral Co-ordinating Committee	• Developing HCWM plan • Evaluating Health Care Waste Management • Mobilising financial resources for HCWM. • Reviewing HCWM policy. • Receiving reports from HCWM Desk Officer on overall performance of HCWM. • Approving appropriate HCWM technologies • Allocating resources for procuring and installation of appropriate technologies in HCWM.
District HCWM Committee	• Developing HCWM plan • Preparing annual budget for HCWM • Allocating financial and human resources for HCWM • Procuring and distributing HCWM equipment and supplies to health facilities • Supervising HCWM practices in the district including CHAM and the private health facilities. • Establishing HCWM database for monitoring and evaluation (M&E), reviewing, reporting and feedback • Collecting and compiling information on HCWM including HCW related injuries and contamination.

	• Reprimand health workers who do not follow HCWM guidelines • Train health workers and auxiliary staff in HCWM. • Advocate and conduct IEC activities for HCWM.
Health centres HCWM Committee.	• The HCMT shall work as the Health centre HCWM committee. The health centres shall include those belonging to MOH&P, CHAM, MLG Developing HCWM plan • Preparing annual budget for HCWM • Allocating financial and human resources for HCWM • Procuring and distributing HCWM equipment and supplies to health facilities • Supervising HCWM practices in the district including CHAM and the private health facilities. • Establishing HCWM database for monitoring and evaluation (M&E), reviewing, reporting and feedback • Collecting and compiling information on HCWM including HCW related injuries and contamination. • Discipline health workers who do not follow HCWM guidelines • Train health workers and auxiliary staff in HCWM. • Advocate and conduct IEC activities for HCWM
District, Town, Municipal and City Councils	• Identifying, recording and reporting any presence of infectious waste and sharps from health care facilities and the community at disposal site or landfills. • Advocating for proper treatment and disposal of HCW within the Assemblies. • Collecting and safely disposing treated HCW and general waste. • Integrating HCWM in the Assembly by-laws. • Enforcing by-laws

5.2 Health facilities staffing and implementation of ICWMP

5.2.1 Staffing

Effective infection control and waste management will need both professional and support staffs that are required for the continuous and proper operation of the respective facilities. Subject to availability of resources (both human resources, technical and financial), the HCFs will employ or designate on a full-time or on surge basis necessary personnel, which will be determined based on the workload in line. Besides the critical other health workers for the respective facility, the infection control, waste management team may be comprised of:

- Designated personnel for Waste management at the Facility
- IPC Coordinator
- Hospital Engineer/ Maintenance Officer/Electrical technician
- Well trained security staff
- Cleaners
- Waste handlers
- Incinerator Operator/Disposal officer
- Medical waste autoclave or microwave operator
- Medical waste autoclave or microwave operator

Staff should be properly training on their roles and responsibilities to ensure that there is adherence and compliance to the healthcare waste management standards. Table 5-2 shows staff involved in the implementation of the ICWMP and their responsibilities. The facilities should ensure there is staff enough to support the operations of the facilities. Where staff have been given other roles other than what they were employed for, ensure on job trainings are carried out.

Table 5- 2: Staff at Health Care Facility and responsibilities during the implementation of the ICWMP

Designation	**Responsibilities**
Health Facility In charges	• Establish a waste-management team to oversee the preparation of specific HCF ICWMP and monitor its implementation, • Ensuring adequate financial resources allocated to fully implement specific ICWMP, • Designate a waste-management officer to supervise and implement the ICWMP in the HCF • Obtain and be familiar with national waste management policies and set regular (e.g. annual) review dates for the facility HCWM policy. • Ensure adequate training for staff and designate the staff responsible for coordinating and implementing training courses on OHS, IPC, Healthcare waste management and emergency response procedures, • Provide measures in place to prevent health-care waste from causing environmental pollution or adverse effects on human health. • Ensure health care waste management system in the HCF is managed according to the national regulations
Departmental Managers	• Develop a facility HCWM plan (goal, budget, personnel, roles, supervision, training, reporting). Allocate adequate financial and human resources to implement the plan including up to final disposal. • Ensure adequate supply of safety boxes, bins, bin liners, and PPE. • Create a climate of support for needle stick injury reporting. • Develop a protocol for management of needle-stick injury. • Advocate for health worker safety. • Provide supportive supervision in HCWM

Healthcare waste management focal person (designated by the Waste management committee)	▪ Ensure the day-to-day operation and monitoring of the waste-management system ▪ Supervise waste handlers and waste management staff ▪ Liaise with the department heads to make sure that their staff are carrying out waste-related tasks properly ▪ Ensure availability of waste management equipment ▪ Monitor performance indicators and ensure reports are brought to the committee. ▪ Manage healthcare waste management budget ▪ Organize staff training and information. ▪ Document, report and review any reported incidents concerning the handling of health-care waste in liaison with the infection-control department. • Liaise with the Supplies Department to ensure that an appropriate range of coded bags and containers for health-care waste, protective clothing, and collection trolleys are available at all times • Be responsible for coordinating maintenance and repair of waste treatment facilities. • Develop maintenance standards for waste management equipment
Procurement Officer	• Liaise with the Environment Expert / officer to ensure a continuous supply of the healthcare waste management commodities (plastic bags and containers of the right quality, spare parts for onsite health-care waste-treatment equipment). Procurement of waste collection service providers if necessary Investigate the possibility of purchasing environmentally friendly products
Hospital Engineer / Maintenance Officer/Electrician	▪ Installing and maintaining waste-storage facilities and handling equipment. ▪ Accountable for adequate operation and maintenance of any on-site waste treatment equipment ▪ Responsible for ensuring that the staff operating on-site waste-treatment facilities are trained in their operation and maintenance.

Waste Handlers	• Collects, separates, contains, labels, and transports solid waste, medical waste & recyclable goods from generation points to specified collection location and incinerator • Tracking and maintaining records of wastes generated from each health facilities/quarantine/isolation centres and laboratories • Empties, relines, & cleans solid & medical waste containers according to procedures • Segregates waste for containment prior to transporting off-site for incineration, • Separates, contains, seals, labels, weighs, & stores high-risk infectious (red bag) waste to be incinerated • Cleans and disinfects medical waste carts • Maintains waste area facility in a clean and orderly condition; sweeps and cleans area at the end of each shift • Assures safe working conditions at all times as designated by the SOP; utilizes safety equipment and/or protective equipment as directed (i.e. safety gloves and eye protection), follows defined safety procedures, and • Follow waste management procedure during waste handling transportation, storage, treatment, and disposal including infection control. • Keep waste records and produce monthly waste management reports.
Incinerator Operator (Disposal Officer)	• Ensure appropriate use, the equipment is maintained and kept clean.
Laboratory Manager	• Accept direct responsibility for the health and safety of those working with bio-hazardous materials and/or select agents and toxins associated with infectious diseases and other communicable diseases, • Adhere to approved emergency plans for handling accidental spills and personnel contamination, • Ensure compliance by laboratory personnel with relevant regulations, guidelines, and policies,

	• Ensure all appropriate personal protective equipment is provided and used. Ensure proper training, including refresher training, and instruction for laboratory personnel in safe practices and protocols, including, at a minimum, training in aseptic techniques and characteristics of the material(s) used. • Tracking and maintaining records of wastes generated from laboratory. • Ensure compliance by waste handler, waste water treatment and incinerator personnel with relevant regulations, guidelines, and policies of infection control and waste management. • Ensuring that all the relevant staff including; waste handler, waste water treatment plant and incinerator personnel are adequately trained in waste management and risk management in waste water treatment plant and incinerator facility respectively.
Healthcare Facility cleaners	• Cleaning of laboratory equipment, such as glassware, metal instruments, sinks, tables, and test panels, using solvents, brushes, and rags: • Mixing of water and detergents or acids in container to prepare cleaning solution according to specifications. • Washing, rinsing, and drying of glassware and instruments, using water, acetone bath, and cloth or hot-air drier. • Scrubbing walls, floors, shelves, tables, and sinks, using cleaning solution and brush. • May sterilize glassware and instruments, using autoclave. • The HCF cleaners should be provided with the minimum required PPE (medical mask, gown, heavy duty gloves, boots or closed shoes) according to the WHO guidelines on Covid-19 Personal Protective Equipment (PPE) for Healthcare Workers.

5.3 Capacity building

Capacity building has been discussed in various sections of the ICWMP. Noting the gaps and needs to capacitate the stakeholders, a special chapter has been developed to collate the information on needs and resources needed to support efforts to enhance the capacity of stakeholders on healthcare waste management. Based on the required Infectious Control and Waste Management mitigation measures, capacity building and training has been structured around four key areas.. The focus will be but not limited to:

1. Infection prevention and control measures,
2. Standard precautions,
3. Infectious HCW management procedures,
4. Training on emergency preparedness and response

The targeted audience for the ICWMP is all healthcare workers (hospitals, isolation, quarantine, PoE and laboratories) including waste handlers, local communities near the healthcare facility and personnel from private sector operators of the waste transportation and disposal service providers. The MoH's training activities shall be oriented towards the quality of healthcare services and prevention of infections.

Whilst it is necessary to reinforce the knowledge of medical professionals in these sectors, it is also important to improve their practices in infection prevention and control as well as on HCW handling and management. Training is also suggested to target private operators and technicians active in maintenance work, cleaning, and the management of healthcare wastes. Promotion of the appropriate handling and disposal of medical waste is important for community health, and every member of the community should have the right to be informed about potential health hazards. The objectives of training on health-care waste and infection control are as follows:

a. To prevent exposure to infectious diseases, health-care waste and related health hazards; this exposure may be voluntary or accidental, because of unsafe disposal methods.

b. To create awareness and foster responsibility among healthcare facility patients and visitors regarding hygiene and healthcare waste management i.e., waste management hierarchy.

c. To inform the public about the risks related to health-care waste, focusing on people living or working near, or visiting, health-care establishments and scavengers on waste dumps.

It is necessary to develop awareness-raising programs for populations providing healthcare, as well as people using recycled objects or living in proximity of garbage dumps as well, as garbage collectors.

There is a need to educate the public in general about community health and safety on the risks associated with improper management of HCWM and the use of recycled objects. Public education will include developing and broadcasting monthly televised messages destined for the public on the dangers linked to infectious HCW; developing and broadcasting weekly radio messages,

notably in English and Kiswahili; initiating a poster campaign in healthcare structures directed towards visitors, and patient caretakers; making information and awareness raising banners; and holding monthly neighbourhood public information sessions. Particular attention will be towards leaving no one behind including those not able to access such common communication channels. The project should leverage the developed Stakeholder Engagement Plan to inform how the project engages various stakeholders and the most suitable approaches or channels of engagement.

It is imperative to train administrative personnel, doctors, nurses, public health officers, lab personnel, phlebotomists, cleaners and waste handlers at national and county level, managerial staff of the technical departments, and waste handlers (orderlies, cleaning personnel and other hospital workers, municipal garbage collectors).

To implement the ICWMP, all relevant parties in the MoH would be trained to be aware of good practices and procedures of infection control and waste management that are stipulated under this plan. The technical support and capacity building training plan is shown on table

Table 5-3 shows the training needs which have been identified using professional judgement, experience in the sector and from literature revies of the challenges facing healthcare waste management in Malawi.

Table 5- 3: Training Plan and Budget for Staff and Support Staff

Capacity Needs	Target Participants	Cost (USD)	Timeline
Training on Infection control and waste management procedures and the roles and tasks for all actors from cradle to grave (Training of trainers, training of staff)	• Professionals and non-professional staff working in the HCF (hospitals, PoE, Blood Centers, isolation and quarantine areas, and in the Laboratories. • Cleaners, morgue attendants waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories. • Staff for waste reporters service providers	60,000	Year 2, Q1
Training on facility level Environmental, Health and Safety, emergency preparedness and response	• Professionals and non-professional staff working in the HCF (hospitals, PoE, Blood Centers, isolation and quarantine areas and in the Laboratories, • Cleaners, waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories.	20,000	Year 2, Q3
Training on biosafety and biosecurity	• Professionals working in the Laboratory Staffs • Cleaners, waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories.	20,000	Year 2, Q3
Community health and safety in relation to hygiene and other standard precautions for infectious disease (i.e. COVID 19).	• Community members and community health workers within the HCF zone of influence.	20,000	Year 2, Q1
Training of HCF on proper implementation of their specific ICWMP and ESMP during operations	• Professionals working in the Laboratory, HCF, Isolation, quarantine and treatment Centre, blood services.	60,000	Year 2, Q1

Training of the medical waste handlers on their HCF specific ICWMP during operations;	• Professionals working in the Laboratory, HCF, Isolation and treatment Centre, blood services.	20,000	Year 2, Q4
Monitoring and supervision	• MOH staff, Project staff, DHMTs	34,000	On going
Total		**234,000**	

Chapter Six: Infection Control and Waste Management Plan

This chapter described the Infection control and waste management plan in detail. The chapter also describes the roles and responsibilities and the implementation budget.

6.1 Plan for mitigation of associated risks

The plan for mitigation of risks associated with the HCFs, Labs, PoE, Isolation and Quarantine, Waste disposal facilities will operate within the confines of the Infection Control and Waste Management Plan and seek ways and means to operationalize the action plan. Each entity will be required to prepare, receive approval, and implement a specific ICWMP for their facility/operation (See Annex 1 for a simplified template for site ICWMP). This specific plan should be based upon their specific characteristics and conditions and meet the requirements stated in this ICWMP. The Infection Control and Waste Management Plan (ICWMP) identifies specific tasks to be executed and assigns responsibility for waste collection to specific departments or agencies.

For the plan to be effectively implemented, the beneficiary facilities (referral hospitals, referral laboratories and healthcare facilities, quarantine, isolation and treatment centres) will develop site specific ICWMP standardized plans based on its existing needs and set-up. The plan should design a mitigation strategy for potential risk associated with; laboratory activities, medical equipment and supplies, infection prevention and control healthcare waste collection, handling, storage, transportation, treatment, and disposal of healthcare waste. The potential risks include among others the following:

- Improper health care waste collection, storage and segregation that have a potential risk to health care facility professionals/ health workers, society and environment,
- Risks of increased disease transmission from poor waste treatment & disposal systems,
- Air pollution due to utilization of poor quality of incinerator technology,
- Environmental pollution due to poor ICWM practices,
- Risk of disease transmission due to waste scavengers and neighbouring communities,
- Environmental contamination as result of obsolete pharmaceuticals,
- Shortage of equipment and supplies on ICWM and PPE and
- Poor management systems for infection control and emergency response in case of any incidents/accidents on site.

The PIT in collaboration with relevant MoH departments will provide tailored training to HCF's in the different aspects related to the management of healthcare waste. This training will be in line with the World Bank Group's EHS Guidelines, current WHO Guidelines and WHO Framework and Malawi Policies, Legislation, Guidelines and Standards. Furthermore, the Project needs to will

have a budget to support supervision and mentorship visits of the HCFs. Through these mentorship visits, the MoH will ensure that guidelines and SOPs for healthcare waste management are being adhered to and necessary equipment shall be provided by the MoH. It is the intention of GoM and its development partners that HCF observe the set guidelines and SOPs for healthcare waste management during health care services are supported accordingly. The main risks are described in this section together with mitigation measures that have been taken from existing operation guidelines established by the MoH for the HCF to be implemented during the project. Therefore, the following table 6-1 shows the Infection Control and Waste management and mitigation Measures for HCF which has the description of the risks, mitigation measures, responsibility of implementation, timelines of implementation and the budget required for the implementation of the measures.

Table 6- 1: Infection Control and Waste management and mitigation Measures for HCF

SN	Activities and potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget (MK)
1	**Waste Generation in HCF from procurement of materials (medicines equipment) and use of HCF operations i.e. laboratory**				
1.1	Improper disposal of waste generated could lead into pollution of the environment through spillages	Wastes generated at the HCF should be segregated on generation and placed in the appropriate receptacles (i.e. bin) as per the segregation rules.	Patients, Health Care Waste Workers (HCWWs)	On Generation	HCF Operational Budget
1.2	Direct exposure of HCF workers and HCWWs to infectious and biohazard waste generated at source could lead into increased risks of transmission of diseases such as COVID-19	All HCF workers involved in infectious disease management and emergency health care services must follow all standard precautions of infections which are; • Hand hygiene, respiratory hygiene/ cough etiquette, • use of personal protective equipment (PPE), environmental cleaning, prevention of needle stick injuries, and • appropriate health care waste management.	MoH; HCF Management	At all times within HCF	HCF Operational Budget
1.3	Inadequate minimization of waste leading into increased risk of environmental contamination	Facilities should consider practices and procedures to minimize waste generation, without sacrificing patient hygiene and safety considerations.	MoH; HCF Management	At all times within HCF	HCF Operational Budget
		Ensure source reduction by purchasing and supplying materials that are less wasteful and/or generate less medical waste.			
		Enhance stock management through frequent auditing; use of the oldest stock first and checking the expiry date of products during receiving and issuing of commodities.			

SN	Activities and potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget (MK)
		Encourage the use of recyclable products. Using materials that can be reused both off-site and on-site.			
		Enforce rigorous and careful segregation of the infectious waste at source helps to minimize the quantities of infectious waste generated.			
		Train relevant staff on waste minimization and benefits especially the medical staff to make changes towards less wasteful clinical practices.			
2	**Segregation and Storage Before Collection**				
2.1	Lack of proper segregation and storage will facilitate mixing of waste. This has the potential to render non-infectious waste to be infectious waste hence increasing the risk of harm to workers, patients and the public	All waste which has not been segregated should be placed in red biohazard bags, labelled, "Biohazardous Waste" or with the international biohazard symbol and the word, "Biohazard".	Health Care Workers (HCWs); HCWWs	On Generation	HCF Operational Budget
		Full red bags must be tied so that leakage or expulsion of contents does not occur and should be contained in a rigid container.			
		A strong, leak-proof plastic bag or container capable of being autoclaved should be used			
		The container can be of any (preferred to be red) colour with a tight-fitting lid and labelled "Biohazard," readable from any lateral direction.			
		Staff should use impermeable bags and hard standing containers			
		Containers must have handles and be easy to clean			
		Staff should ensure the use of easy to clean surfaces for storage and placement of containers containing HCW			
		Management and staff should ensure the availability of water supply for convenient cleanliness and hygiene of storage surfaces.			
		Storage areas, containers, or bags should not be readily accessible to non-staff or animals.			

SN	Activities and potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget (MK)
		Staff must ensure that the maximum storage time of infectious wastes is 48 hours in the cool dry season and 24 hours in the hot dry season.			
		All storage sites should be enclosed to ensure that they are not accessible to the public and livestock and in areas not at risk of flooding.			
2.2	Handling unsegregated waste containing sharps waste including accidental injections after using the same needle for a patient blood/fluid spillage has the potential to increase the risk of harm to workers, patients through injuries and spread of diseases	Used sharps should be placed into the appropriate sharp's container immediately after use- containers must be puncture-proof.	HCWs; HCWWs	On Generation	HCF Operational Budget
		All sharps are disposed of in either a labelled sharps container or a pharmaceutical/chemo sharps container.			
		Containers should be labelled "SHARPS WASTE" or "BIOHAZARD," with the international biohazard symbol			
		¾ full sharps containers must be collected regularly and replaced with empty containers			
		As per WHO guidance, they should be marked INCINERATION ONLY" so that they can be visible from any lateral direction.			
		Provide counselling to the victims of accidental injuries from used injections			
		Provide first aid / first line of treatment to prevent further spread of the infections			
		Pharmaceutical waste, including empty vials and syringes, is placed into a sharp's container or chemo container at the point of generation, stored in a utility room.			
2.4	Unsegregated general waste could increase the	General healthcare waste such as food waste should be disposed of accordingly i.e., through composting, reused as animal feed etc	HCWs; HCWWs	On Generation	

SN	Activities and potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget (MK)
	risk of nuisance smells and odour	General waste will be collected via a separate stream from all health care waste and should not be mixed under any circumstances.			HCF Operational Budget
3	**Transport of HCW Within HCFs for Storage or Direct Final Treatment**				
3.1	Onsite transport of waste from point of generation to storage needs to be managed in a planned manner to avoid environmental risks associated with cross-contamination with general waste, accidental spillage, and exposure of HCWs and patients. Transport, treatment and disposal of waste could increase the likelihood of spread of diseases if there are spillages, emissions to air.	Disinfection of vehicles prior to other uses other than the waste transport Waste transportation should take place during less busy times whenever possible. Set routes should be used to prevent exposure to staff and patients and to minimize the passage of loaded carts through patient care and other clean areas.	HCWs; HCWWs	On Generation	HCF Operational Budget
		Depending on the design of the HCF, the internal transport of waste should use separate floors, stairways, or elevators as far as possible. Regular transport routes and collection times should be fixed and reliable.			
		Associated staff should wear adequate personal protective equipment, gloves, strong and closed shoes, overalls, and masks.			
		Health-care waste can be bulky and heavy and should be transported using wheeled trolleys or carts that are not used for any other purpose.			
		Waste, especially hazardous waste, should never be transported by hand due to the risk of accident or injury from infectious material or incorrectly disposed sharps that may protrude from a container.			
		All waste bag seals should be in place and intact at the end of transportation.			
3.2	Routing of the infected waste in HCFs should be	Separate hazardous and non-hazardous routes should be planned and used.	HCWs; HCWWs	On Generation	

SN	Activities and potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget (MK)
	maintained to minimize risks of exposure and accidents during operating hours.	A specific routing plan should be developed based on the layout of the HCF.			HCF Operational Budget
		Special covered trolleys should be used in transporting HCWs.			
4	**Occupational Health and Safety Management for Health Care Waste Workers**				
4.1	Handling and management of healthcare waste without adequate proper procedures and equipment could expose workers to physical and ergonomic hazards	Adequate awareness and training should be provided.	HCWs; HCWWs	On Generation	HCF Operational Budget
		Only trained personnel should be allowed to operate machinery such as autoclaves and incinerators as these reduce the risk of operational injuries.			
		Provide appropriate PPE to waste handlers			
4.2	Lack of PPE and its use has the potential to increase the likelihood of accidents and incidents	All health care management staff at the HCFs should be trained in emergency response and made aware of the correct procedure for prompt reporting.	HCWs; HCWWs	On Generation	HCF Operational Budget
		Accidents or incidents, including spillages, damaged containers, inappropriate segregation, and any incidents involving sharps, should be reported to the designated person.			
		The cause of the accident or incident should be investigated by a designated person or another responsible officer, who should also take action to prevent a recurrence.			
3	Accidents or injuries arising from needle pricks and using the same needles for patients	Enforce the use of a needle prick register to monitor the incidents of injuries. Regular supervision by the supervisors. Ensure availability of spill kit.	Facility in charges	On going	

6.2 Monitoring Plan for the ICWMP Implementation

To be able to assess the effectiveness of the ICWMP, monitoring indicators for the project activities should be provided in the ICWMP. The monitoring institutions proposed in the ICWMP should use the monitoring indicators, to determine progress made, in implementing the mitigation for the negative impacts. The Project is expected to set aside funds that will help them in the implementation of all ICWM activities. The ICWMP shall also assist in developing Standard Operating Procedures and Waste Management Plans for laboratories based on a quick situation assessment and facilitate the review and updating of existing documentation on health-care waste management plans under this project.

During the operation period, the infection control and waste management issues will be monitored by the Ministry of Health through QMD, EHU and the PIT. The Covid-19 project, through QMD has introduced a tool for monitoring medical waste management in the country which has been configured in DHISII, remaining with orientation of health care workers to start reporting.

All the facilities should collect and reporting data on waste segregation and collection, waste storage, waste transportation, waste treatment and disposal at various intervals including daily, weekly, monthly and quarterly. Monitoring will verify if predicted impacts have occurred and check that mitigation actions recommended in the ICWMP are implemented and their effectiveness. Monitoring will also identify any unforeseen impacts that might arise from project implementation. Monitoring will be undertaken by experts from Ministry of Health (QMD and EHU) Environment & Laboratory experts. Monitoring will be done through site inspection, staff interviews and review of reports received.

Monitoring will consist of checking to see if the proposed measures are being adequately implemented. It is required to follow-up on decisions made to intervene in various activities of infection prevention and control and medical waste management to minimize risks to people and the environment. To ensure that objectives of the ICWMP are achieved, the implementation of the plan shall be monitored on a regular basis internally through the following GoM ministries, departments and agencies which are partners of the project coordinated by Ministry of Health (MoH), whereas the external bodies will be World Bank. These institutions will determine their respective monitoring tools and will work jointly within the monitoring and evaluation mechanism of the project.

Table 6-2 presents a summary of the key parameters to be monitored under the project

Table 6- 2: Summary of key parameters to be monitored

Monitoring parameter	Indicator	Methods	Frequency	Responsibility for Implementation
Waste segregation and collection	Number of HCFs (supported by the project) with colour coded and labelled HCW Receptacles	• Physical verification Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs practicing waste segregation	• Rapid Assessments, • Supervision Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCWs trained in HCW segregation and collection	• Routine data	Monthly	Heads of HCF/ Institution , PIT
	Number of HCFs with PPE for HCW segregation and collection	• HCWM Rapid Assessment Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with national standard guidelines on HCW segregation and collection	• Rapid Assessment Reports	Monthly	Heads of HCF/ Institution, PIT
Waste Storage	Number HCFs with designated temporary storage facilities for HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

	Number of HCFs with temporary storage facility which is inaccessible to unauthorized persons and animals	• -Rapid Assessments • Routine reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with designated temporary storage facilities for HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with designated temporary storage facilities for HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with standard storage containers	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with standard PPE for HCW storage personnel	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
Waste Transportation	Number of HCFs with standard PPEs for transporting HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

	Number of HCFs with equipment for transporting HCW (waste bins and skip truck)	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs aware of risks associated with improper handling of HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs catchment population aware of health risks of HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs trained in HCW transportation	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with standard PPEs for HCW transportation	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with standard equipment for HCW transportation	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with national standard guidelines on HCW transportation	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

Waste Treatment and Disposal	Number of HCFs with equipment for HCW treatment	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with treatment plant/facilities for HCW	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with standard guidelines for HCW treatment	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of H/Ws trained in HCW treatment and disposal	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with PPEs for treatment and disposal.	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number HCFs with equipment for HCW treatment	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

	Number HCFs with standard equipment for HCW disposal (waste bins and skip truck)	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with national standard guidelines on HCW treatment and disposal	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with designated operator to man incinerators and disposal facilities	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of disposal sites with legible signage	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with designated supervisor to man incinerators and disposal facilities	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
Health care waste related accidents and spillages	Number of health institutions with annual emergency response plan for HCW related accidents and spillages	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

	Number of HCFs using national standard PPEs for preventing accidents and spillages	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs reporting on HCW related accidents and injuries	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HWs treated after HCW related spillages following IP standard guidelines	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of H/Ws vaccinated against Hepatitis B	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of HCFs with national standard guidelines on accidents and spillages	• Assessment reports • Distribution report	Monthly	Heads of HCF/ Institution, PIT
	Number of H/Ws trained in Accident and spillage management	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

Infection Prevention and Control	Number of HCFs able to follow standard precautions namely e.g. hand hygiene	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT
	Number of health facilities performing environmental cleaning according to standards	• Rapid Assessments • Routine Reports	Monthly	Heads of HCF/ Institution, PIT

6.3 Reporting System

Based on the information on waste records to be collected daily and compiled into weekly and monthly reports, The Head of the health facility of delegated officer such as the IPC Focal point or Waste Management Officer shall report monthly in the DHISII through the HMIS officer at the facility. Furthermore, the PIT and MoH partners shall report monthly on compliance activities.

6.4 Frequency for monitoring and Review

The monitoring frequency for ICWMP will be undertaken on quarterly basis during the operation phase. World Bank will as well do periodic implementation support mission biannually. The ICWMP will be reviewed every annually to update the plan and incorporate the emerging waste management issues in the plan.

6.5 Reporting System

Currently, there is no common in-country monitoring and reporting tool for the infectious waste management. Quarterly monitoring reports of ICWMP would be compiled by IPC focal which will be reported in the DHISII by the HMIS officer at the facility.

As part of its focus to strengthen healthcare system in the country, the project will stimulate the need to establish and institutionalize in country infectious waste management monitoring system.

Chapter Seven: Conclusions and Recommendations

This chapter provides the conclusions and the recommendations for implementation of this ICWMP.

7.1 Conclusion

This Infection Control and Waste Management Plan (ICWMP) provides a structured approach to mitigating risks associated with infections and improper waste handling, safeguarding public health, healthcare workers, and the environment in Malawi. By adhering to established protocols and best practices outlined in this document, health care facilities can effectively prevent the spread of infections, reduce environmental contamination, and ensure compliance with regulatory standards. The success of the ICWMP depends on consistent implementation, regular monitoring, and the commitment of all stakeholders to maintain high standards of hygiene and waste management.

7.2 Recommendations

The following are the key recommendations to ensure effective and efficient implementation of the ICWMP;

- **Strengthen Training and Capacity Building:** carry out regular training programs to all responsible personnel involved in infection control and waste management to enhance knowledge, skills, and compliance with ICWMP protocols.
- **Establish Robust Monitoring and Evaluation Systems:** Periodic audits as specified in this plan and evaluations should be implemented to assess the effectiveness of infection control measures and waste management practices, with necessary adjustments made to address gaps.
- **Promote Stakeholder Engagement:** carry out routine stakeholder engagement and collaboration among healthcare facilities, regulatory bodies, and waste management to ensure the effective implementation of the ICWMP.
- **Adopt Sustainable Practices:** Emphasis should be placed on waste minimization, recycling, and environmentally friendly disposal methods to reduce the environmental impact of healthcare operations.
- **Ensure Adequate Resource Allocation:** Sufficient resources, including funding, infrastructure, and equipment, should be allocated to support infection control measures and the safe management of healthcare waste.
- **Update ICWMP regularly:** The ICWMP should be reviewed and updated annually to reflect advancements in technology, changes in regulations, and emerging challenges in infection control and waste management.

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Annex I: Infection Control and Waste Management Plan (ICWMP) Template

1. Introduction

1.1 Describe the project context and components- Described however content should be reduced and summarised .

1.2 Describe the targeted healthcare facility (HCF): The description is not clear and indicates the facilities are not known however information on the TB or COVID- project could help make a description of the health care facilities and assess the waste management equipment available in these sites .

- Type: E.g. general hospital, clinics, inpatient/outpatient facility, medical laboratory, quarantine or isolation centers;
- *Special type of HCF in response to COVID-19: E.g. existing assets may be acquired to hold yet-to-confirm cases for medical observation or isolation;*
- Functions and requirement for the level infection control, e.g. biosafety levels;
- Location and associated facilities, including access, water supply, power supply;
- Capacity: beds

1.3 Describe the design requirements of the HCF, which may include specifications for general design and safety, separation of wards, heating, ventilation and air conditioning (HVAC), autoclave, and waste management facilities. The facilities are existing and building works not anticipated

2. Infection Control and Waste Management

2.1 Overview of infection control and waste management in the HCF

- Type, source and volume of healthcare waste (HCW) generated in the HCF, including solid, liquid and air emissions (if significant). This has not been described . The waste management information from the previous projects could help assess the volume of wastes and sources
- Classify and quantify the HCW (infectious waste, pathological waste, sharps, liquid and non-hazardous) following WBG EHS Guidelines for Healthcare Facilities and pertaining GIIP. This has been classified in general terms without specifying the specific wastes to be generated as a result of the project and the anticipated volume as a result of the new project .
- Given the infectious nature of the novel coronavirus, some wastes that are traditionally classified as non-hazardous may be considered hazardous. It's likely the volume of waste will increase considerably given the number of admitted patients during COVID-19

outbreak. Special attention should be given to the identification, classification and quantification of the healthcare wastes.

- Describe the healthcare waste management system in the HCF, including material delivery, waste generation, handling, disinfection and sterilization, collection, storage, transport, and disposal and treatment works- This has been described in general terms and some measures indicated would not apply to the HCFs and not realistic. The plan should be clear on how HCF wastes will be handled from the source to final disposal highlighting measures that will work for the HCFs. For example if there are no disposal sites for the district for other hazardous wastes , how will these be disposed ,what will be the alternative disposal measures proposed .
- Provide a flow chart of waste streams in the HCF if available-
- Describe applicable performance levels and/or standards- describe applicable standards and licence requirements for waste management
- Describe institutional arrangement, roles and responsibilities in the HCF for infection control and waste management. These have been described but important to indicate how the institutions will coordinate to effectively manage wastes.

2.2 Management Measures

- Waste minimization, reuse and recycling: HCF should consider practices and procedures to minimize waste generation, without sacrificing patient hygiene and safety considerations. The procedures and practices should consider what has been working for the previous project and provide solutions for the waste management challenges which were faced .
- Delivery and storage of specimen, samples, reagents, pharmaceuticals and medical supplies: HCF should adopt practice and procedures to minimize risks associated with delivering, receiving and storage of hazardous medical goods. Hampered
- Waste segregation, packaging, color coding and labelling: HCF should strictly conduct waste segregation at the point of generation. Internationally adopted method for packaging, color coding and labelling the wastes should be followed.
- Onsite collection and transport: HCF should adopt practices and procedures to timely remove properly packaged and labelled wastes using designated trolleys/carts and routes. Disinfection of pertaining tools and spaces should be routinely conducted. Hygiene and safety of involved supporting medical workers such as cleaners should be ensured. The plan should be clear on transportation of wastes .
- Waste storage: A HCF should have multiple waste storage areas designed for different types of wastes. Their functions and sizes are determined at design stage. Proper maintenance and disinfection of the storage areas should be carried out. Existing reports suggest that during the COVID-19 outbreak, infectious wastes should be removed from HCF's storage area for

disposal within 24 hours. The plan should indicate what storage facilities are available or what would be anticipated as temporary storage areas

- Onsite waste treatment and disposal (e.g. an incinerator): Many HCFs have their own waste incineration facilities installed onsite. Due diligence of an existing incinerator should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended. For new HCF financed by the project, waste disposal facilities should be integrated into the overall design and ESIA developed. Good design, operational practices and internationally adopted emission standards for healthcare waste incinerators can be found in pertaining EHS Guidelines and GIIP.
- Transportation and disposal at offsite waste management facilities: Not all HCF has adequate or well-performed incinerator onsite. Not all healthcare wastes are suitable for incineration. An onsite incinerator produces residuals after incineration. Hence offsite waste disposal facilities provided by local government or the private sector are probably needed. These offsite waste management facilities may include incinerators, hazardous wastes landfill. In the same vein, due diligence of such external waste management facilities should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended and agreed with the government or the private sector operators. How will wastes be transported to an offsite disposal site? Thiis should be clear in the plan
- Wastewater treatment: HCF wastewater is related to hazardous waste management practices. Proper waste segregation and handling as discussed above should be conducted to minimize entry of solid waste into the waste water stream. In case waste water is discharged into municipal sewer sewerage system, the HCF should ensure that waste water effluent comply with all applicable permits and standards, and the municipal waste water treatment plant (WWTP) is capable of handling the type of effluent discharged. In cases where municipal sewage system is not in place, HCF should build and properly operate on site primary and secondary waste water treatment works, including disinfection. Residuals of the on site waste water treatment works, such as sludge, should be properly disposed of as well. There're also cases where HCF waste water is transported by trucks to a municipal waste water treatment plant for treatment. Requirements on safe transportation, due diligence of WWTP in terms of its capacity and performance should be conducted. The plan has not explained how waste water will be treated on site following previous experience. Explain any need to discharge waste water and the requirements for discharge. Indicate that WWTP would not be available on the HCFs due to the nature of the facilities.

3. Emergency Preparedness and Response

Emergency incidents occurring in a HCF may include spillage, occupational exposure to infectious materials or radiation, accidental releases of infectious or hazardous substances to the environment, medical equipment failure, failure of solid waste and wastewater treatment

facilities, and fire. These emergency events are likely to seriously affect medical workers, communities, the HCF's operation and the environment.

Thus, an Emergency Response Plan (ERP) that is commensurate with the risk levels is recommended to be developed. The key elements of an ERP are defined in ESS 4 Community Health and Safety (para. 21).

4. Institutional Arrangement and Capacity Building

A clearly defined institutional arrangement, roles and responsibilities should be included. A training plan with recurring training programs should be developed. The following aspects are recommended:

- Define roles and responsibilities along each link of the chain along the cradle-to-crave infection control and waste management process;
- Ensure adequate and qualified staff are in place, including those in charge of infection control and biosafety and waste management facility operation.
- Stress the chief of a HCF takes overall responsibility for infection control and waste management;
- Involve all relevant departments in a HCF, and build an intra-departmental team to manage, coordinate and regularly review issues and performance;
- Establish an information management system to track and record the waste streams in HCF; and
- Capacity building and training should involve medical workers, waste management workers and cleaners. Third-party waste management service providers should be provided with relevant training as well.

5. Monitoring and Reporting

Many HCFs in developing countries face the challenge of inadequate monitoring and records of healthcare waste streams. HCF should establish an information management system to track and record the waste streams from the point of generation, segregation, packaging, temporary storage, transport carts/vehicles, to treatment facilities. The HCF is encouraged to develop an IT based information management system should their technical and financial capacity allow.

As discussed above, the HCF chief takes overall responsibility, leads an intra-departmental team and regularly reviews issues and performance of the infection control and waste management practices in the HCF. Internal reporting and filing systems should be in place.

Externally, reporting should be conducted as per government and World Bank requirements. The plan should include reporting responsibilities.