REPUBLIC OF RWANDA

MINISTRY OF HEALTH
P.O. BOX 84 KIGALI
www.moh.gov.rw

MEDICAL WASTE MANAGEMENT PLAN (MWMP)
Prepared for the Stunting Prevention and Reduction Project

November 2017

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ACRONYMS

HCWM: Health care waste management

GOR: Government of Rwanda

MOH: Ministry of Health

MINALOC: Ministry of Local Administration

MINEDUC: Ministry of Education

MIGEPROF: Ministry of Gender and Family

EDPRS: Economic Development and Poverty Reduction Strategy

EHS: Environmental Health and Safety

EA: Environmental Assessment

EMP: Environmental Management Plan

IFC: International Finance Corporation of the World Bank Group

SLIPTA: Stepwise Laboratory Quality Improvement Process towards Accreditation

RBC: Rwanda Biomedical Center

PPP: Public Private Partnership

NGO: Non-Governmental Organization

NSPHCWM: National Strategic Plan for Health Care Waste Management

HCF: Health Care Facility

HC: Health Centre

DH: District Hospital

EXECUTIVE SUMMARY

The Stunting Prevention and Reduction Project (SPRP) aims to support the government to adopt a bold, new national strategy to improve awareness and understanding of chronic malnutrition which tends to be an invisible problem that has serious long-term negative consequences for cognitive development, educational attainment, and lifetime earnings. It will draw on Rwanda's unique experiences in promoting community health, performance based approaches, and technological innovations in the health sector.

Activities under the SPRP component 2 include supporting and incentivizing Health Care Facilities (HCF) in the targeted districts to improve utilization and coverage of an enhanced package of high-impact nutrition and health interventions benefiting children, and pregnant and lactating women. These HCF shall augment utilization of health services and generate incremental health care waste.

The project Medical Waste Management Plan's (MWMP) overall objective is to prevent and/or mitigate the negative effects of increased generation of medical waste on human health and the environment. The plan proposes measures to prevent the spread of infection and reduce the exposure of health workers, patients and the general public to the risks from medical waste. The plan is to be used by all project implementation entities to manage medical waste associated with project activities. These entities will have appropriate procedures and capacities in place to manage the medical waste.

Chapter 1 of this document provides an overview of the SPRP components and activities and Chapter 2 outlines the current medical waste facilities and practices in Rwanda. An overview of the existing policies and laws guiding the management of waste generated by healthcare activities is provided in Chapter 3 as well as references to the World Bank policies, IFC/WB Group EHS Guidelines.

Chapter 4 gives an overview of the potential environmental and social impacts of the project and proposed mitigation measures. Chapter 5 provides the key components of this MWMP which include the institutional arrangements, the implementation plan, the monitoring plan and the capacity building plan and associated costs.

Detailed description of national medical waste management procedures is included in the annex.

INTRODUCTION

The Government of Rwanda has requested support of the World Bank for a project aimed at reducing stunting among children under five years of age (with a focus on those under two) in targeted districts of Rwanda. The SPRP will support the government to adopt a bold, new national strategy to improve awareness and understanding of chronic malnutrition which tends to be an invisible problem that has serious long-term negative consequences for cognitive development, educational attainment, and lifetime earnings. It will draw on Rwanda's unique experiences in promoting community health, performance based approaches, and technological innovations in the health sector.

While the project promotes a national approach, targeted districts will benefit from more intensive support to make optimal use of limited resources. District plans to eliminate malnutrition will serve as the basis for financing activities at the decentralized level. Health facilities in the targeted districts will be supported to improve access to an enhanced package of high-impact nutrition and health interventions by addressing supply side bottlenecks and strengthening key delivery platforms. The proposed project components are:

1) **Prevention of Stunting at Community and Household Levels.** This component includes activities aimed at training, mentoring and incentivizing community health workers and equipping them with tools and technologies to deliver more effectively a comprehensive package of cost effective interventions with a focus on the critical first 1000 days.

2) **High-impact Health and Nutrition Services.** Health facilities in the targeted districts will be supported to improve access to an enhanced package of high-impact nutrition and health interventions by addressing supply side bottlenecks and strengthening key delivery platforms.

3) **M&E and Project Management**. To complement the core interventions described above, this component will support rigorous evaluations; learning and knowledge sharing at both the community and district level and supervising, coordinating and providing oversight on the project activities.

The institutional, implementation and coordination arrangements for the proposed SPRP will build on strong existing platforms. The Ministry of Health will be supported to handle its policy and strategy formulation roles and the Rwanda Biomedical Center will be responsible for coordinating the implementation of the project through the Single Project Implementation Unit that has managed previous Bank-funded health projects. At the decentralized level, district authorities will be responsible for providing oversight, working with other stakeholders. The District Plans for Elimination of Malnutrition (DPEM) will serve as one of the key documents guiding district level investments using decentralized service delivery modalities.

Health facilities in the targeted districts will be supported to improve access and health services, leading to an increase in the volume of medical waste generated.

An assessment conducted in 35 healthcare facilities in the country in October 2016 found a national volume of 5.168 kg/day of medical waste generated by inpatients and outpatients and total amount of 60,775,164 kg of waste per year, made of 74% of non-infectious waste, 24% of liquid waste and 1.2 % of infectious and/or hazardous waste.

Several policies are in place to guide medical waste management, including a National Policy on Injection Safety, Prevention of Transmission of Nosocomial Infection and Health Care Waste Management that clearly defines how key medical waste has to be managed, transported and disposed. A set of National Healthcare Waste Management Guidelines have been also prepared and applied.

The primary purpose of this plan is to provide guidance to health professionals and waste handlers in proper collection, segregation, transportation, treatment and final disposal of medical wastes in a manner that does not endanger the lives of health care providers, supporting staff and communities along the road where medical waste is transported.

CHAPTER 1. PROJECT OVERVIEW

The Government of Rwanda has put the elimination of stunting high on the country's political and development agenda, with food security, nutrition, and early childhood development prioritized as foundational issues to address within the *Economic and Poverty Reduction Strategy* (2013–2018) and in the forthcoming *National Strategy for Transformation and Prosperity* (2017-2024). Rwanda has been a member of the Scaling Up Nutrition (SUN) Movement since 2011, and established a Joint Action Plan to Eliminate Malnutrition (2016-2020). In recognition of the importance of the first 1,000 days of life, the government launched the "*1,000 days campaign in the land of 1,000 hills*" initiative in 2013.

1.1 PROJECT DEVELOPMENT OBJECTIVE AND COMPONENTS

The proposed Project Development Objective (PDO) is to contribute to the reduction in the stunting rate among children under five years of age (with a focus on those under two) in the targeted districts. The main project beneficiaries will consist of children under five (particularly children under two to reach them in the critical 1,000 day window of opportunity, before stunting becomes largely irreversible) as well as pregnant and lactating women in 13 high stunting districts that have been prioritized for World Bank support. Other beneficiaries will include adolescent girls, to reach women early and improve their health and nutrition status prior to entering their reproductive health years. The poorest households will benefit from improvements in access to clean water and improved sanitation facilities, and the public at large will benefit from national media campaigns and revamped behavioral change communications.

The project will support the government to adopt a bold, new national strategy to improve awareness and understanding of stunting. The project will leverage two of Rwanda's strongest platforms, community health worker and performance based financing, to improve knowledge and behavior change, and reach key beneficiaries with a comprehensive set of nutrition and health services, while at the same time improving WASH and ECD interventions that are expected to contribute to stunting reduction. The project will adopt a phased, learn by doing approach, underpinned by a solid operational research agenda around convergence, behavioral change, and performance based approaches. While the project will promote a national approach, targeted districts will benefit from more intensive support to have a maximum impact on stunting. DPEMs will serve as the basis for financing activities at the decentralized level. Districts will be expected to prepare updated, consolidated plans with clear strategies and targets, showing what other partners are financing and what gaps persist.

Component 1: Prevention of Stunting at Community and Household Levels. This component will support CHWs to deliver more effectively a comprehensive package of cost effective health and nutrition interventions, focusing on the critical 1,000 day window. In addition, it will support complementary WASH interventions targeted to the most vulnerable groups (*ubudehe* 1/2) in the 13 participating districts, to address deficits in environmental health. Finally, the component will serve as a platform for rolling out the home-based ECD strategy, in close collaboration with the Expanded Public Works ECD model funded under the social protection operation. More specifically, the project will: (i) support the design and implementation of a new national *communication strategy*, including a state of the art media campaign and innovative communications tools customized to the Rwandan context; (ii) t*rain, mentor, incentivize and equip community health workers to conduct growth promotion*, including early identification and follow up of children falling behind; behavior change communications on enhanced infant and young child care, feeding, and WASH practices; health and nutrition education for pregnant and lactating

women and early referral to health facilities for nutrition services and health checkups; (iii) *establish home-based, early childhood development models for care* that serves as platforms for enhanced infant and child feeding, hygiene and sanitation practices and early learning and stimulation; (iv) develop strategies and approaches based on the *positive deviance methodology*; (v) develop and test strategies for reaching adolescent girls with nutrition counseling and weekly iron and folic acid supplementation; (vi) p*rovide targeted support to vulnerable households with young children to improve access to WASH interventions* (i.e. sanitary latrines, handwashing stations with soap, household water treatment and safe water storage); and (vii) strengthen *multi-sectoral district planning, budgeting, coordination, supervision, and monitoring.*

Component 2: High-impact Health and Nutrition Services

Health facilities in the targeted districts will be supported and incentivized to improve utilization and coverage of an enhanced package of high-impact nutrition and health interventions. These interventions include those identified in the government's *Acceleration of Reduction of Stunting Strategy* which are in line with the 2008/2013 Lancet recommendations: (i) *height monitoring and growth promotion* and effective tracking of faltering children, early initiation and exclusive breast feeding, deworming, micronutrient supplementation (i.e. Vitamin A supplementation; therapeutic zinc supplementation with ORS; multiple micronutrient supplement powders)*;* and (ii) critical *nutrition and health interventions for women* (i.e. four antenatal care visits, four postnatal care, iron/folic acid supplementation, post-partum family planning, counseling on child care, complementary feeding and hygiene). Health facilities will be held accountable and incentivized to provide these interventions through the national PBF program. The project will support health facilities with training, information technologies and logistical support from the national level.

Component 3: M&E and Project Management

This component will support Monitoring and Evaluation, and project management. To this end, it will support the following activities: (i) conducting rigorous evaluations to draw timely lessons on what works, how much it costs, and how it can be scaled up; (ii) facilitating learning and knowledge sharing at both the community and district level; and (iii) supervising, coordinating and providing oversight on project activities. As participating districts scale up interventions, the project will support learning and knowledge sharing

1.2. PROJECT INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

The institutional, implementation and coordination arrangements for the Stunting Prevention and Reduction Project will be anchored on existing platforms and seek to strengthen relevant capacities and systems for project implementation. Consistent with its mandate, the Ministry of Health (MoH) will continue to handle its policy and strategy formulation roles and responsibilities, ensuring oversight and coordination among the health sector actors and partners. The Rwanda Biomedical Center (RBC) will be responsible for overall project management, actively engaging in the national nutrition working group to ensure promotion and use of best buy evidence-based interventions; developing and refining nutrition guidelines, BCC materials and the communication strategy; providing technical guidance to the targeted districts; and conduction joint supervision. The Health Sector Working Group and related technical working groups which handle issues related to nutrition, will be kept informed about project activities, and consulted, as needed.

At the local government level, district authorities will be responsible for providing oversight, ensuring effective coordination, and promoting collaboration among key stakeholders. The DPEMs, that are updated annually, will serve as the main vehicle for guiding Bank support for district level activities, using decentralized service delivery modalities to make accountable local

authorities. The different administrative levels of the district namely sectors, cells and villages, will play their respective roles to ensure coordination within their administrative jurisdictions to fulfill their basic service delivery mandates for prevention and reduction of stunting.

Health centers in the targeted districts will be supported to carry out the core nutrition and health interventions proposed under the project and to mentor CHWs. Health centers will receive goods and equipment from the national level. Health personnel will benefit from local training to be organized by district or national authorities or will benefit from e-learning to minimize disruptions to service delivery. Health centers will benefit from PBF incentive payments for the delivery of a core package of health and nutrition interventions.

The SPIU, under the RBC will handle the following functions: (i) financial management, including flow of funds to different stakeholders; (ii) procurement of goods, and equipment to ensure economies of scale and efficiencies; (iii) securing consultant services; and (iv) oversight of safeguard provisions. The SPIU will elaborate a Project Implementation Manual (PIM) with guidance from the RBC and in close collaboration with the Maternal, Child and Community Health (MCCH) Division. The PIM will describe in greater detail the roles and responsibilities of all key stakeholders; implementation modalities for each project component; fiduciary and social safeguard responsibilities and arrangements; and coordination mechanisms at different levels. The PIM will also include the health and nutrition indicators to be incorporated in the national PBF scheme in the targeted districts; proposed payment levels; modalities for channeling funds to health centers and CHW cooperatives; and proposal for mainstreaming these incentives to ensure sustainability.

The Ministry of Health is working at improving the policy and regulatory framework for HCWM and to prepare a National Strategic Health Care Management Plan. In absence of a National Plan, a Medical Waste Management Plan limited to the SPRP activities was prepared to address all the potential impacts which could arise from the project.

CHAPTER 2. MEDICAL WASTE PRACTICES IN RWANDA

The Ministry of Health has taken all necessary measures to minimize the risks likely to result from improper medical waste management both in health facilities and in communities. In this regard, Health care waste management and injection safety have been given due priority whereby training of health care providers has been conducted, national and district hospital incinerators purchased and plans to purchase additional ones are underway. Provision of personal protective equipment, auto disabled syringes and needles, disinfectants and availing post exposure prophylaxis for victims of accidental occupational exposures (blood and amniotic fluid during labor and delivery) is being implemented. Safe storage of sharp waste, separation of waste according to their category at production site, waste transportation and destruction in a safe manner is extremely vital.

The primary purpose of this Plan is to provide guidance and propose capacity building for health professionals and waste handlers of the health facilities targeted by the SPRP to apply existing procedures for medical waste collection, segregation, transportation, treatment and final disposal in a manner that does not endanger lives of health care providers, supporting staff and communities.

2.1 WASTE GENERATION ESTIMATION

The Rwanda Health Sector Strategic Plan 2012–2018 has among key indicators to increase the number of healthcare facilities with effective medical waste management systems from 55% in 2012 to 88% in 2018[1].

An assessment of waste quantities and types generated by health facilities was conducted in 2016 in 35 health facilities, comprising 3 referral hospitals, 2 provincial hospitals and 31 district hospitals. This assessment, based upon daily waste per inpatient and waste per out-patient has been extrapolated to determine the national volume of medical waste and brought to light an estimated average of 5.168 kg/day of medical waste generated by inpatients and outpatients.

This assessment shows that from the total volume of medical waste produced in one year by health facilities in the country, 74% are non-infectious waste, 24% are liquid waste and 1.3% of infectious and/or hazardous waste (Infectious, sharps, pharmaceutical, radioactive, cytotoxic, chemical).

Table 1: *Total quantity of Health Care Wastes generated in 35 Health Facilities within one year*

Description	Total quantity in kg per year
Infectious Wastes	599,994
Sharps Wastes	96,482
No Infectious Wastes	45,076,608
Pharmaceutical Wastes	38,603
Radioactive Wastes	4,620
Genotoxic/ Cytotoxic	47,364
Chemical Wastes	23,862
Nonhazardous general Wastes	263,976
Liquid Wastes (m3)	14,543,346

[1] MoH 2012, Rwanda Third Strategic Plan 2012-2018

Special Wastes (Electronic Wastes)	80,309
Total	60,775,164

2.2 CHARACTERIZATION OF HEALTHCARE WASTE

Major sources of healthcare waste come from the following healthcare facilities in the country: hospitals, university hospitals, general hospitals, district hospitals, other healthcare facilities, emergency medical care, services, healthcare centres and dispensaries, obstetric and maternity clinics. Other health structures generating waste are outpatient clinics, dialysis centres, long-term healthcare establishments and hospices, transfusion centres, military medical services, prison hospitals or clinics, medical and biomedical laboratories, biotechnology laboratories and institutions, medical research centres, mortuary and autopsy centres, animal research and testing, blood banks and blood collection services.

1) Infectious waste: Infectious waste is material suspected to contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:

- Waste contaminated with blood or other body fluids;
- Cultures and stocks of infectious agents from laboratory work;
- Waste from infected patients in isolation wards, surgery and autopsies (e.g. excreta, tissue, and dressing from infected or surgical wounds, clothes soiled with human blood or other body fluid).

2) Pathological waste:

- Pathological waste could be considered a subcategory of infectious waste, but is often classified separately – especially when special methods of handling, treatment and disposal are used.
- Pathological waste consists of tissues, organs, body parts, blood, body fluids and other waste from surgery and autopsies on patients with infectious diseases;
- It also includes human fetuses and infected animal carcasses; Recognizable human or animal body parts are sometimes called anatomical waste.
- Pathological waste may include healthy body parts that have been removed during a medical procedure or produced during medical research.

3) Sharps waste: Sharps are items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpels and other blades, knives, infusion sets, saws, broken glass and pipettes. Whether or not they are infected, such items are usually considered highly hazardous health-care waste.

4) Pharmaceutical waste: Pharmaceutical waste includes expired, unused, spilt and contaminated pharmaceutical products, such drugs, vaccines and sera (serum) that are no longer required. The category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues and drug vials.

5) Chemical waste:

- Hazardous chemical waste consists of discarded solid, liquid and gaseous chemicals; for example, from diagnostic and experimental work and from cleaning and disinfecting procedures. In the context of protecting health, it is considered to be hazardous if it is

corrosive (e.g. acids of pH <2 and bases of pH >12), flammable, reactive (explosive, water reactive, shock sensitive) and oxidizing.

- Non-hazardous chemical waste consists of chemicals with none of the above properties; for example, sugars, amino acids and certain organic and inorganic salts, which are widely used in transfusion liquids.

6) Non-hazardous general waste: Non-hazardous or general waste is waste that has not been in contact with infectious agents, hazardous chemicals or radioactive substances and does not pose a sharps hazard. It is generated from offices, kitchens, and packaging material from stores.

2.3 HEALTH CARE WASTE TREATMENT AND DISPOSAL AS PER LEVEL OF HEALTH CARE FACILITY

Table 2: *Options of health care waste treatment and disposal as per level of HCF*

	CHWs/Health Post	**Health Center**	**District Hospital**
Sharps	Transfer to HC	Transfer to DH	Incineration
Infectious	Transfer to HC	Transfer to DH and deep burial	Incineration/deep burial
Highly infectious	Transfer to HC	Transfer to DH and deep burial and deep burial	Incineration
Pharmaceutical	Transfer to HC	Return to DH	Incineration, return to source or manufacturer

CHAPTER 3. LEGAL FRAMEWORK AND INSTITUTIONAL ARRANGEMENTS

3.1 POLICY FRAMEWORK

The Constitution of Rwanda creates the foundation to improve public health and the Vision 2020 emphasizes commitment of the GoR to provide equitable access to a standardized package of quality health services in Rwanda.

The Health Sector Policy (2005) brought a deep reform of health services as the policy was based on three major strategies: (i) decentralization of the health system using the district health center as the basic operational unit; (ii) development of primary care health system; and (iii) reinforcement of community participation in the management and financing of services (including the *Mutuelles de Santé*, the community health insurance scheme). The 2012-2018 Health Sector Strategic Plan III aims to strengthen Rwanda's focus towards sustainable development and decentralization of health services.

The Environmental Health Policy (2008) provides guidance on appropriate environmental health legal and institutional issues, stressing the need for adequate financial, human and material resources for effective environmental health. The implementation of this policy is guided by the Health Strategic Plan with districts responsible for budgetary allocations for environmental health service delivery to communities.

The National Policy on Injection Safety, Prevention of Transmission of Nosocomial Infections and Healthcare Waste Management (2009) provides guidance to health professionals on putting in place mechanisms, systems and practices to prevent transmission of infections through injections and other medical procedures and ensures that medical waste is safely managed and disposed.

The National Environmental Policy (2003) has among its objectives to improve the health and the quality of life of every citizen and promote sustainable socio-economic development through rational management and utilization of resources and the environment. Article 5.3.6 recommends a national strategy for specific management of chemical products, biomedical and industrial waste. According to this policy, Environmental Impact Assessments (EIAs) must be carried out prior to development of infrastructure projects.

The National Policy and Strategy for Water Supply and Sanitation Services (2004) recommends sustainable and affordable access to a safe water supply, sanitation and waste management services policy and specifies that waste disposal shall be planned and managed with a view to minimize environmental impact and ensure the protection of water resources.

3.2 LEGAL FRAMEWORK

The Organic Law on Environmental Protection and Management (2005). This law determines the modalities for protection, conservation and promotion of the environment in Rwanda and includes related rules and regulations. It defines hazardous waste as any substance whether solid, liquid or gaseous that causes serious harm to human health, security and other biodiversity together with the quality of environment.

The Rwanda Labor Code (revised in 2009) covers occupational health and safety legislation. The ministerial order determining conditions on Occupational Health and Safety (2012) provides general and specific rules and regulations related to health and safety at the workplace, including control of air pollution, noise and vibration (art.29), protective clothing and appliances (art.46) and fire-fighting measures (art.39).

The Ministry of Health has developed National Guidelines on Healthcare Waste Management (2016) aiming to guide health service providers in the management of waste generated from health care activities and ultimately mitigate risks of exposure and transmission of infectious diseases to service providers, patients and the community being served. Moreover, the Ministry prepared two sets of guidelines in 2014: (i) guidelines for the prevention and management of Viral Hemorrhagic Fever in health care settings which include injection safety and waste management recommendations; and (ii) guidelines on sorting, transportation, treatment and final disposal of medical waste from site of generation to site of disposal. These guidelines aim at improving injection safety and healthcare waste management in the country and categorize wastes into infectious sharp waste, infectious non-sharp waste and non-infectious waste.

National Standards Operating Procedures on Healthcare Waste Management were also prepared in 2016, aiming to serve as a framework for providing direction and structure in the proper management of HCW, thereby supplementing the here mentioned Guidelines. This SOP defines the chain of responsibilities for healthcare waste management and the best practices to apply along the chain.

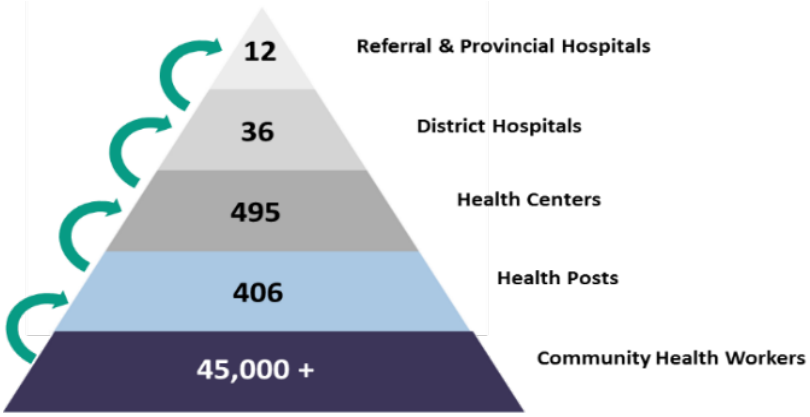
3.3. INSTITUTIONAL FRAMEWORK

The Ministry of Health, through its technical arm, the Rwanda Biomedical Center (RBC) is the executing agency of the current project. The Single Project Implementation Unit (SPIU) within the RBC will be responsible for day to day coordination of project activities.

The Rwanda health system consists of twelve national referral hospitals including the King Faycal Hospital (KFH), Teaching Hospital of Kigali (CHUK), Teaching Hospital of Butare (CHUB), Rwanda Military Hospital (RMH) and the Ndera Neuropsychiatric Hospital (HNP).

The system also includes thirty-six District Hospitals. Since 2011, the government has established District Hospitals at the core of health service delivery through the District Health System (DHS) which comprises the district hospital and a network of health centers either public, government assisted, not for profit or private.

Figure 1: ***Organization Structure of Health Care Services Delivery System in Rwanda***



3.4. WORLD BANK OPERATIONAL POLICIES

The World Bank Environmental and Social Safeguards Policies include key Operational policies (OP) designed to ensure that potentially adverse environmental and social consequences are identified, minimized, and mitigated.

The only safeguard policy triggered by the RSPP Project is the OP/BP 4.10 Environmental Assessment. There will be no land acquisition and no constructions are planned under this project. The Project will not be implemented on disputed areas or on international waters.

This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies'. This policy requires Environmental Assessment of projects proposed for Bank financing to ensure that such projects are environmentally sound and sustainable. If a project falls into categories A, a Comprehensive Environmental Assessment (also known as EIA or ESIA for Social and Environmental Impact Assessment) must be conducted to respond to Bank requirements and must include an environmental management plan. For Projects falling on category B the Environmental Assessment (EA) can result in development of an EMP only. The operational policies require that a project categorized as A or B consults project-affected groups and local nongovernmental organizations (NGOs) about the project's environmental aspects and takes their views into account. It also requires the project to disclose the EA or EMP reports at a public place accessible to project-affected groups and in the local language as well as to the World Bank external website prior to project appraisal.

3.5. WORLD BANK ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES

The General Environmental, Health and Safety Guidelines of IFC/World Bank Group compile best practices for hazardous and non-hazardous waste management, occupational and community health and safety which can apply to health facilities. The general guidelines offer guidance for effective management of environmental, health, and safety (EHS) issues and considerations for various facilities including health care facilities (HCF). Applicable to the project, the guidance includes:

- Identifying EHS project hazards and associated risks during implementation;
- Roles of relevant health care facility staff in assessing and managing EHS impacts and risks and carrying out specialized environmental management functions such as preparing project specific environmental management plans and procedures;
- Assessing and understanding the likelihood and magnitude of EHS risks and impacts;

- Risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment;
- Favoring strategies that eliminate the cause of the hazard at its source;
- Preparing workers and local communities to respond to accidents, providing technical resources to effectively and safely control such events; and
- Improving EHS performance of all the project implementation health care facilities through regular monitoring of facility performance and effective accountability.

The health care facilities' specific EHS guidelines include information relevant to the management of EHS issues associated with HCF which in the case of the project will include decentralized health centers.

3.6. INTERNATIONAL CONVENTIONS

The GoR is signatory to a number of conventions, notably, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention, the Montreal Protocol and the Biodiversity Convention, that have some relevance to how HCW is managed. The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes was also signed in 1991. These international conventions, although binding on the GoR, are not yet fully incorporated into any national legislation for the management of highly hazardous waste.

CHAPTER 4: POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND PROPOSED MITIGATION MEASURES

The SPRP will intervene at the community and health center levels in 13 districts. The total number of health centers is not yet defined and there were no site specific assessments conducted nor public consultations for the preparation of this Medical Waste Management Plan taking into consideration that the SPRP activities will not involve civil works or land acquisitions.

Implementation of the SPRP has anticipated an increased utilization of health services, which is likely to generate incremental health care waste which can be negligible in term of volume but still need careful management. This MWMP aims at strengthening the waste management system in place in these HCF, taking into consideration that the majority has limited capacities to incinerate, transport or dispose sharp, infectious and highly infectious waste.

The major potential environmental and health risks related to such facilities are outlined in the table 3 below.

Table 3: *Potential environmental and social impacts and proposed mitigation measures from health facilities targeted by the SPRP*

Activities	**Potential Impacts**	**Mitigation Measures**	**Indicators**	**Responsibility for Implementation and supervision**	**Responsibility for Monitoring**
Antenatal care Immunization	Pathological -Infectious waste Sharp waste Pharmaceutical waste (expired vaccines)	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Delivery and pre-natal care. Handling human parts, immunization	Pathological -Infectious waste Sharp waste Pharmaceutical waste (expired vaccines)	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Postnatal Care Immunization	Pathological -Infectious waste Sharp waste Pharmaceutical waste (expired vaccines)	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Family planning	Infectious and no infectious wastes	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC

laboratory test, injections	Infectious waste chemical waste Sharp waste Pharmaceutical waste (expired vaccines)	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Care of the newborn. Immunization	Infectious waste Sharp waste Pharmaceutical waste (expired vaccines)	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Storage of Medical Waste	Infectious waste , Injuries for waste handlers, environmental pollution,	- Public awareness - Training - Use appropriate equipment - Apply EHS and waste management procedures	# training Volume of waste stored	HCF & MoH	MoH & RBC
Transport of waste to disposal sites	Infectious waste , Injuries for waste handlers, environmental pollution	- Use appropriate equipment and vehicles - Apply EHS and waste management procedures	# messages aired Volume of waste recycled, incinerated or disposed	HCF & MoH	MoH & RBC
Disposal Site	Infectious waste , Injuries for waste handlers, environmental pollution,	- Public awareness - Training - Use appropriate equipment	Volume of waste incinerated or disposed	HCF & MoH	MoH & RBC

CHAPTER 5: MEDICAL WASTE MANAGEMENT PLAN AND COSTS

5.1 OBJECTIVE

The Ministry of Health (MoH) defines the mission and desired direction for future management of health care waste in the health care sector of Rwanda as follows:

"Develop, implement and maintain an integrated and sustainable HCWM system in Rwanda that will minimize the adverse impacts of HCW on public health and the environment that will reflect a balance of the economic, social and ecological needs of Rwanda".

Good management of healthcare waste is essential if infections in hospitals are to be reduced and damage to the environment minimized. The choice of appropriate, proper and affordable technologies for the processing and disposal of healthcare waste, taking into consideration both the technical and financial resources available in the country is an important element of good healthcare waste management.

The Constitution of Rwanda creates the foundation to improve public health and the Vision 2020 emphasizes commitment of the GoR to provide equitable access to a standardized package of quality health services in Rwanda. The plan is structured with the following priority objectives:

1) Minimize the transmission of infection through improper treatment and disposal of infectious and biological waste
2) Avoid any risks of injuries and transmission of infection through improper management and disposal of sharp waste
3) Minimize environmental degradation when managing and disposing of medical waste
4) Minimize costs of waste disposal through efficient processes and income generation
5) Make waste disposal a sustainable business
6) Ensure that the operational plan responds to Rwanda's Strategic Plan and Objectives for medical waste management
7) Minimize medical waste volumes
8) Build public and private sector management and operational capacity
9) Increase public awareness

The project Medical Waste Management Plan's (MWMP) overall objective is to prevent and/or mitigate the negative effects of increased generation of medical waste from project interventions on human health and the environment. The plan proposes measures to prevent the spread of infection and reduce exposure of health workers, patients and the general public to the risks from medical waste. The plan is to be used by all project implementation entities to manage medical waste associated to project activities. These entities will have appropriate procedures and capacities in place to manage the medical waste.

Until the health centers involved in this SPRP are identified, this MWMP is planned for 200 health centers located in the 13 Districts targeted by the project.

Detailed description of national medical waste management procedures is included in the annex.

5.2 STORAGE OF MATERIALS AND VACCINATIONS

Medical products need storage in a supervised environment. The HCFs will ensure controlled and secure storage of materials under the project.

Vaccine Storage and Handling

Exposure of vaccines to temperatures outside the recommended ranges can decrease their potency and reduce their effectiveness. The HCFs should ensure proper vaccine storage and handling procedures. Vaccines require proper storage from the time they are manufactured until they are administered. By following established storage and handling procedures and practices, the HCFs will ensure that patients will get the full benefit of vaccines; and waste generate therefrom will adequately be managed.

Storage and Handling Plans

Every HCF facility should have up-to-date written internal policies for routine and emergency vaccine storage and handling. These policies should be available in writing as a reference for all staff members. A routine storage and handling plan provides guidelines for daily activities, such as:

- Storing and handling vaccines
- Managing inventory
- Managing potentially compromised vaccines

Every facility should also have an emergency vaccine retrieval and storage plan which identifies back-up storage facilities. Forgotten vials of vaccine left out on the counter or vaccines stored at improper temperatures are examples of how vaccines can be potentially compromised.

Recommendations for handling sharps

- Use safer needle devices and needleless devices to decrease needle stick;
- Do not bend, recap, or remove contaminated needles and other sharps unless such an act is required by a specific procedure or has no feasible alternative;
- Do not shear or break contaminated sharps;
- Have needle containers available near areas where needles may be found;
- Discard contaminated sharps immediately or as soon as feasible into appropriate containers; and
- Used disposable razors should be considered contaminated waste and disposed of in appropriate sharps containers.

5.3 MEDICAL WASTE MANAGEMENT PROCEDURES

WHO recommends that the first step in medical waste management is to minimize waste. It is advisable that the HCF should develop a mechanism to identify gaps and propose actions for efficient waste management at facility level. The plan should clearly define, the roles and responsibilities of key personnel engaged in waste management at the facility (i.e. to cover generation, segregation, transportation and disposal). The following aspects of medical waste

management procedures should be adopted by the HCFs. Detailed description of national medical waste management procedures is provided in the annex.

- Medical Waste Segregation, Collection, and Transport
- Waste Segregation Strategies
- On-site Handling, Collection, Transport and Storage
- Waste Handling Safety Measures
- Medical Waste Storage and Packaging
- Transport to External Facilities
- Disposal of Contaminated Waste
- Waste Minimization, Reuse, and Recycling

5.4 INSTITUTIONAL ARRANGEMENTS

The institutional, implementation and coordination arrangements for the proposed SPRP are built on strong existing platforms. The Ministry of Health will be supported to handle its policy and strategy formulation roles and the Rwanda Biomedical Center will be responsible for coordinating the implementation of the project through the Single Project Implementation Unit that has managed previous Bank-funded health projects. At the decentralized level, district authorities will be responsible for providing oversight, working with other stakeholders. The DPEM will serve as the main vehicle for guiding World Bank support for district level activities, using decentralized service delivery modalities to make accountable local authorities. The healthcare waste management structure is built from the community level up to the referral level, as shown in the following flow chart:

Figure 2: ***Flow of Health Care Waste Management***

As the RBC has limited capacities in the implementation of World Bank safeguards instruments, it will collaborate with the MOH department of environmental health to strengthen SPIU's supervision of the implementation of this Medical Waste Management Plan. In addition, capacity building of the SPIU and the district health teams on the implementation of environmental safeguards policies will be undertaken.

At the decentralized level, two committees are in place at the Health Center and District Hospital levels for effective Health Care Waste Management: the Infection Prevention Committee and the Hygiene Committee. These committees work closely and are composed of the Environmental Health Officer, the Laboratory Officer, pharmacist and the HCF administrator. Waste management will follow the health care waste treatment and disposal mechanism described in table 2.

The Rwanda Environment Management Authority (REMA) is the oversight authority on environmental issues in Rwanda. Its role will be of monitoring environment indicators as identified in this MWMP. The role of REMA includes:

- oversight monitoring: as the lead agency responsible for the protection of environment in Rwanda, REMA will play the leading oversight role of monitoring the activities of the project according to the Organic Law establishing REMA and its functions.

- site inspection visits: REMA can undertake site visits to inspect and verify for themselves the nature and extent of the impacts and the extent to which the mitigation measures proposed in this MWMP are being complied with or vice versa. They will then be expected to make viable recommendations based on their findings to the SPIU.

The World Bank is the financier of the project including for the implementation of the MWMP. The Bank will conduct regular supervisions and ensure that compliance is achieved as per the requirements of the MWMP.

5.5 MEDICAL WASTE MANAGEMENT PLAN

Table 4: *Operations Planning Matrix for the Medical Waste Management*

Project planning matrix		outputs	Budget in $	Responsibility for implementing	Responsibility for Monitoring
Objective 1: Promote *safe, economical, and environmentally friendly* management of medical waste within the healthcare facilities					
Result: The medical waste is managed in a sustainable manner in healthcare facilities					
Activities	Strengthen the existing medical waste management regulations to cover all the existing threats	Regulations	-	MoH & HCFs	MoH, HCFs & RBC
	Appoint a person or a group in charge of medical waste management	Designated person or team	-	MoH & HCFs	MoH, HCFs & RBC
	Equip healthcare facilities with medical waste management tools, including Personal Protective Equipment and clothing, equipment for waste segregation and transport	medical waste management equipment/HF: (PPE clothing for 3 waste handlers 35$x6, waste segregation bins 35$x20 and trolleys 235$x3)	$1,615 /HCF $323,000 for 200 HCF	MoH & HCFs	MoH, HCFs & RBC
	Enforce medical waste management Regulations in healthcare facilities (waste segregation, transport and disposal)	Sorting bins, pointed object disposal system, segregate medical waste, dispose and/or transport them following their noxiousity (recyclable, disposable on public landfill or incinerate)	-	MoH & HCFs	MoH, HCFs & RBC
	Promote more than 50% recycling of non-infectious waste (papers, garbage...)	Recyclables material and composting	-	MoH & HCFs	MoH, HCFs & RBC
	Ensure safe disposal of non-dangerous medical waste	Collect and dispose non-dangerous waste which cannot be recycled into local landfill	-	HCFs & local CBOs	MoH

	Ensure safe disposal, transport and incineration of hazardous waste (sharp, infectious, highly infectious and pharmaceutical)	car renting for hazardous waste transport for incineration into District Hospital: 565$ for 24 trips/year	$565/ district $7,345 for 13 districts	MoH & HCFs	MoH, HCFs & RBC
Objective 2: Formalize ongoing training and awareness programs for all appropriate health care facility staff, waste handlers, and home users.					
Results: Awareness raised from healthcare staff and community on the risks associated with HCW and have acquired the knowledge, attitudes and appropriate practices in handling BMW					
	Develop and launch medical waste management awareness program for home users.	Number of awareness-raising meetings on healthcare waste management in community (1 radio spot aired in 6 local radio)	5,535 $	MoH/RBC	RBC, HCFs & MoH
	Training all the operators involved medical waste management	Number of operatives trained	-	MoH & HCFs	MoH, HCFs & RBC
	Evaluating the implementation of the training plan	Evaluation report	-	MoH & HCFs	MoH, HCFs & RBC
Objective 3: Identify and prevent environment pollution from health care wastes.					
Result: Optimize the volume of waste generated					
Activities	Reduce the volume of pharmaceutical supplies by optimizing the supply system.	Low quantity of expired or damaged pharmaceutical to be incinerated	-	MoH & HCFs	MoH, HCFs & RBC
	Identify recycling uses for major medical waste streams.	Partnership convention	-	MoH & HCFs	MoH, HCFs & RBC
	Maintain HF sanitation facilities, water points and wastewater management systems	Number of toilets and water points available, Operational septic tanks…	$300/HCF $60,000 for 200 HCF	MoH/RBC	MoH/RBC

5.6 MONITORING

5.6.1 Principles

Monitoring is required to follow-up on project commitment and to ensure the effective implementation of the mitigation actions in the medical waste management so as to protect human health and the environment. This will be achieved through periodic internal and external processes of monitoring, at the levels of all the project implementation entities involved.

The aim of the monitoring is to establish appropriate criteria to address potential negative impacts of MWM and to ensure that unforeseen impacts are detected, and the mitigation measures implemented at an early stage. Specific objectives of the monitoring plan are to:

- Ensure that any additional impacts are addressed appropriately;
- Check the effectiveness of the recommended mitigation measures;
- Ensure that the proposed mitigation measures are appropriate;
- Demonstrate that medical waste management is being implemented according to plan and existing regulatory procedures; and
- Provide feedback to implementing entities to make modifications to the operational activities where necessary.

To measure the effectiveness of the MWMP, all activities to be monitored by a follow-up, within the framework of a coordinating structure which will involve representatives of the MOH, health facilities (notably referral hospitals) as well as the districts and the NGOs active in the health and environment field. The MOH will coordinate monitoring and will centralize the follow-up/evaluation information and data in a data bank and an information system for medical waste management.

Table 5: *Monitoring plan for the implementation of the MWMP*

Activities	Period	Responsible
Monitoring and follow-up of the implementation of the MWM Plan	Monthly	Infection and Prevention Committee& Hygiene Committee at the HCF
	Monthly	Infection and Prevention Committee& Hygiene Committee at the DH
Monitoring of the Capacity building activities: - Training - Awareness-raising	Quarterly	MOH: Environmental Health team
Supervision and reporting	Quarterly	MOH: Environmental Health team
	Quarterly	RBC SPIU

Supervision/ Evaluation / Audit	As per requirement	REMA/WB Independent consultant

As per the requirements of the REMA and following the World Bank Operational Policies, periodical supervisions missions, public consultations and/or environmental audits shall be conducted on the project sites to assess the performance of this MWMP.

5.6.2 Monitoring arrangements

The medical waste management plan will be monitored principally by the RBC SPIU in collaboration with the other key implementing partners. The MWMP will be part of the project's overall monitoring plan; and the RBC SPIU will ensure that the relevant staff at the HCFs will supervise and monitor the implementation of the plan. It is recommended that one staff should be designated for this role in the HCFs. The cost of implementing the MWMP plan should be included in the project cost.

5.6.3 Monitoring indicators

Considering the type of interventions implemented by this project which are anticipated to have limited, site specific impacts, the following will be used to monitor progress in implementing the medical waste management plan:

- Existence of human resource capacity in health care facilities with basic knowledge in medical waste management;
- Existence of records on waste generation;
- Existence of records of waste handling, transportation and disposal; and
- Existence of documentation on internal policies, procedures and protocols for proper and safe medical waste management & disposal.

5.7 CAPACITY BUILDING AND AWARENESS RAISING PLAN

Training is mainly structured around five points, focusing on required Health Care Waste Management at all levels of the health sector system:

1. Injection safety
2. Handwashing
3. Stock management and safe injection practices
4. Healthcare Waste Management
5. Communication to change attitudes and advocacy
6. The roles and responsibilities of healthcare and support personnel.

The targeted audience is health workers at all levels, waste handlers at health facilities, local communities and personnel from private sector operators. The MOH's training activities are generally 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 HCW handling and management. Training should also involve private operators and DH technicians active in maintenance work, cleaning and the management of solid 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 public education on health-care waste are as follows:

1. To prevent exposure to health-care waste and related health hazards; this exposure may be voluntary, in the case of scavengers, or accidental, because of unsafe disposal methods.
2. To create awareness and foster responsibility among hospital patients and visitors to health-care establishments regarding hygiene and health-care waste management.
3. To inform the public about the risks linked to health-care waste, focusing on people living or working near, or visiting, health-care establishments, families of patients treated at home, and scavengers on waste dumps.

It is necessary to develop awareness-raising programs for populations providing or receiving home healthcare, people using recycled objects or living in proximity of garbage dumps as well as garbage collectors. These programs can be led with support of the NGOs and CBOs that have a wide experience in environment and health.

There is a need to educate the public in general about the risks associated with bad 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 handling HCW, particularly needles and other sharp objects; developing and broadcasting weekly radio messages radio, notably in Kinyarwanda; initiating a poster campaign in healthcare structures directed towards visitors, and patient caretakers; making information and awareness-raising banners; and holding monthly neighborhood public information sessions led by NGOs.

It is imperative to train administrative personnel, doctors, midwives, nurses and waste handlers at district level, managerial staff of town technical departments, and waste handlers (orderlies, cleaning personnel and other hospital workers, municipal garbage collectors).

5.8 CONCLUSION

The implementation of the project Medical Waste Management Plan's (MWMP) shall reinforce the HCF waste management system in place through:

a) Basic tools and PPE for waste segregation and facilitation for waste disposal, recycling or incineration with an average annual cost of $390,345;

b) Awareness raising for HCW risks and management, targeting healthcare professionals, waste handlers and communities for a total estimated cost of $5,535

The supervision, monitoring and reporting activities shall be taken care of through the existing Health Care Waste Management Structure within the MoH and the RBC SPIU.

ANNEX 1: MEDICAL WASTE MANAGEMENT PROCEDURES

1.1. Medical Waste Segregation, Collection and Transportation

This section explains the importance of streamlining the process of waste collection, handling and transport to ensure compliance with occupational health and safety and environmental control requirements.

1.2 Organization

Each HF must have a dedicated staff/company of waste handlers.
Waste handlers must be trained and equipped to undertake the handling, internal transportation, spill management, blood, body fluid exposure management and storage requirements of the HF.

1.3 Internal transportation

All HF should conduct a review to optimize the waste collection process, reduce handling and transportation, and to promote safe work practices.
Transportation routes should avoid where possible food preparation and heavily used areas.

1.4 Waste labeling

All waste liner bags and waste containers are to be color coded and inscribed with hazard marks or stickers and identified in accordance with international waste labeling symbols.

1.5 Health Care Waste Tracking

Tracking of HCW is necessary to enable both the regulatory bodies and all other stakeholders to follow the movement of waste from generation to safe final disposal. Tracking helps to rapidly identify the source of waste, facilitates segregation, provides feedback, assists in providing data for education purposes, decision making facilitates auditing and may be used to allocate resources for HCWM.

The use of tracking forms is therefore necessary and would enable both the regulatory bodies and all concerned to follow the movement of waste from generation to safe final disposal.

All liner bags /containers of waste must be clearly marked to identify the HF, unit (e.g. Maternity Ward) and date of collection.

The illegal dumping of Health care waste by unscrupulous waste collectors/generators poses a great risk to public health. Tracking the movement of waste from the points of generation through transportation to the final disposal point would guard against the malpractice of illegal dumping).

1.6 Handling waste bags

a) Sharps must always be placed in injection safety boxes and never be placed in waste bags.
b) Waste must be contained in colour coded and well labeled plastic bags
c) General waste should be contained in well labeled black bags.
d) Waste bags must not be over filled (approx 2/3 of capacity).
e) The volume of a waste bag should not exceed 55 liters.
f) Excess air should be excluded without compaction, prior to closure using a bag tie at the point of waste generation.
g) All bags should be held away from the body by the closed top of the bag, and placed directly into a mobile garbage bin or trolley.
h) Where waste bags are sealed and stored pending collection, they should be in a secure place with restricted access.
i) There should be a Waste collection schedule.

1.7 Storage for waste

a) A storage location for health-care waste should be designated inside the HF.
b) Unless a refrigerated storage room is available, storage times for Health care waste (i.e. the delay between production and treatment) should not exceed the following:
    i. 48 hours during the cool season
    ii. 24 hours during the hot season
c) **Cytotoxic waste** should be stored separately from other health-care waste in a designated secure location.
d) **Radioactive waste** should be stored in containers that prevent dispersion, behind lead shielding. Waste that is to be stored during radioactive decay should be labeled with the type of radionuclide, the date, and details of required storage conditions.

1.8 Spill Management

1.8.1 General spill management

HF should manage waste spills as they occur in the facility.

j) In the case of gross spills, containment is the principal role.
k) It is essential that personnel involved in spill management receive education and training in emergency procedures and handling requirements.
l) Spill kits should be readily available throughout the hospital with their location known by all staff.
m) Spill kits that have been used should be disposed of with the type of waste that has been cleaned up, e.g. used cytotoxic spill kits should be disposed of with cytotoxic waste.
n) All spillage should be documented per department and per facility.

1.8.2 Infectious waste spill kit.

Infectious waste spill kit should contain at least:

a) Broom, a pan and scraper, mop and mop bucket
b) A large (10 liter) reusable plastic container or bucket with fitted lid, containing;
c) 2 infectious waste bags for the disposal of clinical waste;
d) Disinfectant containing (1%) 10,000 ppm available chlorine or equivalent;
e) Rubber gloves suitable for cleaning
f) Detergent, sponges / disposable cloths
g) Personal protective equipment including eye protection, an apron or long
h) Sleeve impervious gown, a face mask, heavy duty gloves.
i) Incident report form
j) Waste spill sign.

1.8.3 Cytotoxic spill kit

Cytotoxic spill kit should contain at least:

a) Mop and mop bucket, a pan and scraper.
b) A large (10 litre) reusable plastic container or bucket with fitted lid, containing;
c) 2 cytotoxic waste bags for the disposal of cytotoxic waste
d) 2 hooded overalls, shoe covers, long heavy-duty gloves, latex gloves, a face
e) Mask and eye protection
f) Absorbent toweling / absorbent spill mat
g) Incident report form
h) Waste spill sign

1.8.4 Mercury spill kit

Mercury spill kit should contain at least:

a) 2 unbreakable lidded containers
b) Spill sign

c) Pasteur pipette, eye dropper
d) Sodium thiosulphate
e) Face mask
f) Dust pan and brush
g) Sulfur powder
h) Incident report form.

1.9 Collection

a) Wastes should not be allowed to accumulate at the point of production. For this reason, a routine programme for their collection should be established as part of the health-care waste management plan.
b) Nursing and other clinical staff should ensure that waste bags are tightly closed or sealed when they are about three-quarters full.
c) Light-gauge bags can be closed by tying the neck, but heavier-gauge bags probably require a plastic sealing tag of the self-locking type.
d) Bags should *not* be closed by stapling.
e) Sealed sharps containers should be placed in a labelled, yellow infectious health-care waste bag before removal from the hospital ward or department.
f) The following recommendations should be followed by the waste handlers:
    i. Waste should be collected daily (or as frequently as required) and transported to the designated central storage site.
    ii. No bags should be removed unless they are labeled with their point of production (hospital and ward or department) and contents.
    iii. The bags or containers should be replaced immediately with new ones of the same type.
    iv. A supply of fresh collection bags or containers should be readily available at all locations where waste is produced.
    v. The person in charge should ensure that adequate supplies (3 months) are available and that procurement is timely to ensure the facility does not run out of waste collection bags.

1.10 Transportation

a) All transporters of biomedical waste must be appointed by the Ministry of Health or Manager of the health facility and must obtain a transportation license from RURA.
b) The transporter shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site or plant.
c) The Ministry or Manager of a HF shall ensure that:
    i. The collection and transportation of such waste is conducted in such a manner that will not cause scattering, escaping and/or flowing out of the waste;
    ii. The vehicles and equipment for the transportation of waste are in such a state that shall not cause the scattering of, escaping of, or flowing out of the waste or emitting of noxious smells from the waste;
    iii. The vehicles for transportation and other means of conveyance of waste shall follow the scheduled routes approved by RURA from the point of collection to the disposal site or plant; and

iv. During the transportation of waste, the transporter should possess at all times a duly filled tracking document and shall produce the same on demand to any law enforcement officer.

d) Biomedical waste shall be:
   i. Transported in a specially designed vehicle or other means of conveyance so as to prevent scattering, escaping, flowing, spillage or leakage of the waste.
   ii. It is recommended that the vehicle is closely lockable, covered, labeled, leak proof and corrosion proof preferably internally lined with aluminum or stainless steel.
   iii. Any vehicle used for transportation of waste or any other means of conveyance shall be appropriately labeled.

1.10.1 On-site transport for collection purposes

a) Mobile garbage bins (MGBS) and trolleys should be used when transporting waste to decrease spills, minimize collector contact with waste and minimize manual handling.
b) Loads contained in MGBs and trolleys should be less than 55kgs.
c) All bins must be colour coded and marked as specified in **Annex 2.**
d) Health-care waste should be transported within the hospital or other facility by means of wheeled trolleys or containers that are not used for any other purpose and meet the following specifications:
   i. Easy to load and unload;
   ii. No sharp edges that could damage waste bags or containers during loading and unloading;
   iii. Easy to clean.
e) Trolleys and MGBs must be dedicated singularly for collecting waste and must be made of rigid material, lidded, lockable (if used for storage), leak proof and washable.
f) These MGBs and trolleys should be labeled according to the type of wastes contained, cleaned regularly and must never be overfilled.
g) Waste collection rounds should be performed as often as necessary to minimize housekeeping hazards.
h) When cleaning trolleys and MGBs:
   i. Rinse with cold water then wash with warm water and a neutral detergent.
   ii. Trolleys and MGBs should then be drained to sewer and left to dry.
   iii. Clean trolleys and bins should be stored separately to soiled containers.
   iv. Appropriate personal protective equipment should be worn when cleaning MGBs.
   v. Waste water may only be diverted to the sewer.
i) The vehicles should be cleaned and disinfected daily with an appropriate disinfectant (Glutaraldehyde or Peracetic acid).
j) All waste-bag seals should be in place and intact at the end of transportation.
k) Use of wheelbarrows is not recommended for transportation.

1.10.2 Off-site transportation of waste

1.11 Regulation and control system

a) The health-care waste producer is responsible for safe packaging and adequate labeling of waste to be transported off-site and for authorization of its destination.

b) The tracking form **(Annex 5 or 6)** has to be signed at the point of destination and shall be kept as records by the health facility as proof of proper disposal of waste.
c) The signed tracking form will be submitted as part of records in the reports.
d) Packaging and labeling of waste should comply with the Ministry of Health HCWM Guidelines and with international agreements (such as the Basel Convention) if wastes are shipped abroad for treatment and disposal.
e) The control plan for health-care waste should have the following components:
    i. A consignment note **(Annex 6)** should accompany the waste from its place of production to the site of final disposal. On completion of the journey, the transporter should complete the part of the consignment note especially reserved for him and return it to the waste producer.
    ii. The transporting organization should be registered with RURA.
    iii. Handling and disposal facilities other than the DH should hold a permit, issued by RURA, allowing the facilities to handle and dispose of health-care waste.

1.12 Routing

a) Health-care waste should be transported by the quickest possible route, which should be planned before the journey begins.
b) After departure from the waste production point, every effort should be made to avoid further handling.
c) If handling cannot be avoided, it should be pre-arranged and take place in adequately designed and authorized premises by the Waste Management focal person.
d) Handling requirements can be specified in the contract established between the waste producer and the carrier.

1.13 Treatment and disposal for health care waste

1.13.1 Treatment and disposal options

a) Health care waste should be treated prior to disposal so as to ensure protection from potential hazards posed by these wastes.
b) To be effective, treatment must reduce or eliminate the risk present in the waste so that it no longer poses a hazard to persons who may be exposed to it.
c) The common method of treatment is: incineration; steam sterilization, chemical disinfection, autoclaving and microwave irradiation.
d) Other methods that can be used include encapsulation and energization, shredding, macerations and grinding.
e) However treatment methods should be chosen according to the type of waste and these guidelines.
f) In-case of infectious and sharp wastes, all the treatment methods are applicable (**Annex 7**).

1.13.3 Waste disposal options

1.13.3.1 General disposal options

a) After disinfection or incineration, infectious health care waste becomes non-risk waste and may be finally disposed of in landfill sites. The commonly used disposal method in Rwanda is land disposal which include District disposal sites, protected ash and waste pits.

b) However, certain types of Health care waste, such as anatomical waste, will still have an offensive visual impact and this is culturally unacceptable in Rwanda. Such wastes should therefore be buried and use of placenta pits.
c) Other methods may include the return of the wastes to the supplier/manufacture.
d) Aerosol containers may be collected with general health care waste once they are completely empty, provided that the waste is not destined for incineration. Contractors for recycling the cans can be called upon.
e) All radioactive waste (e.g. swabs, syringes for diagnostic or therapeutic use) may be collected in yellow bags or containers for infectious waste if these are destined for incineration.
f) Appropriate containers or bag holders should be placed in all locations where particular categories of waste may be generated.
g) Instructions on waste separation and identification should be posted at each waste **generation** and **collection** point to remind staff of the procedures.
h) **Containers should be removed when they are three-quarters full.**
i) Staff should never attempt to correct errors of segregation by removing items from a bag or container after disposal or by placing one bag inside another bag of a different colour.
j) If general and hazardous wastes are accidentally mixed, the mixture should be treated as hazardous Health care waste.

1.13.3.2 Inertization

a) The process of "inertization" involves mixing waste with cement and other substances before disposal in order to minimize the risk of toxic substances contained in the waste migrating into surface water or groundwater.
b) It is especially suitable, for pharmaceuticals and for incineration ashes with a high metal content (in this case the process is also called "stabilization").
c) For the inertization of pharmaceutical waste, the packaging should be removed, the pharmaceuticals ground, and a mixture of water, lime, and cement added.
d) A homogeneous mass is formed and cubes or pellets are produced on site and then can be transported to a suitable storage site.
e) Alternatively, the homogeneous mixture can be transported in liquid state to a landfill and poured into District waste.
f) The following are typical proportions for the mixture:
    i. 65% pharmaceutical waste;
    ii. 15% lime;
    iii. 15% cement;
    iv. 5% water.

    The process is reasonably inexpensive and can be performed using relatively unsophisticated equipment.
g) Other than personnel, the main requirements are a grinder or road roller to crush the Pharmaceuticals, a concrete mixer, and supplies of cement, lime, and water.
h) The main way to achieve this is to sort the Health care waste into the various categories to minimize the need for expensive or complicated disposal methods.

Table 6: *IFC/WBG guidelines on treatment and disposal methods for project medical care waste*[2]

Type of waste	Summary of treatment and disposal options / notes
Infectious waste: Includes waste suspected to contain pathogens (e.g. bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical material (e.g. tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.	**Waste Segregation Strategy**: Yellow or red colored bag / container, marked "infectious" with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved. **Treatment**: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Safe burial on hospital premises; Sanitary landfill; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)[e] • Highly infectious waste, such as cultures from lab work, should be sterilized using wet thermal treatment, such as autoclaving. **Anatomical waste** should be treated using Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator[e]).
Sharps: Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	**Waste Segregation Strategy**: Yellow or red color code, marked "Sharps". Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled "infectious waste". **Treatment**: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Encapsulation; Safe burial on hospital premises; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)[e] • Following incineration, residues should be landfilled. • Sharps disinfected with chlorinated solutions should not be incinerated due to risk of generating POPs. Needles and syringes should undergo mechanical mutilation (e.g. milling or crushing) prior to wet thermal treatment
Pharmaceutical waste: Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.).	**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container. **Treatment**: Sanitary landfill[a]; Encapsulation[a]; Discharge to sewer [a]; Return expired drugs to supplier; Incineration (Rotary kiln; pyrolytic incinerator [a]); Safe burial on hospital premises[a] as a last resort. • Small quantities: Landfill disposal acceptable, however cytotoxic and narcotic drugs should not be landfilled. Discharge to sewer only for mild, liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Incineration acceptable in pyrolytic or rotary kiln incinerators, provided pharmaceuticals do not exceed 1 percent of total waste to avoid hazardous air emissions. Intravenous fluids (e.g. salts, amino acids) should be landfilled or discharged to sewer. Ampoules should be crushed and disposed of with sharps. Large quantities: Incineration at temperatures exceeding 1200 °C. Encapsulation in metal drums. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal.
Chemical waste: Waste may be hazardous depending on the toxic, corrosive, flammable, reactive, and genotoxic properties. Chemical waste may be in solid, liquid, or gaseous form and is generated	**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container resistant to chemical corrosion effects.

2 https://ifcext.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_HealthCareFacilities/$FILE/Final+-+Health+Care+Facilities.pdf

through use of chemicals during diagnostic / experimental work, cleaning, housekeeping, and disinfection. Chemicals typically include formaldehyde, photographic chemicals, halogenated and nonhalogenated solvents[d], organic chemicals for cleaning / disinfecting, and various inorganic chemicals (e.g. acids and alkalis).	**Treatment**: Return unused chemicals to supplier; Encapsulation[a]; Safe burial on hospital premises[a]; Incineration (Pyrolytic incinerator[a]; • Facilities should have permits for disposal of general chemical waste (e.g. sugars, amino acids, salts) to sewer systems. • Small hazardous quantities: Pyrolytic incineration, encapsulation, or landfilling. Large hazardous quantities: Transported to appropriate facilities for disposal, or returned to the original supplier using shipping arrangements that abide by the Basel Convention. Large quantities of chemical waste should not be encapsulated or landfilled.
General health care waste (including food waste and paper, plastics, cardboard)**:**	**Waste Segregation Strategy**: Black bag / container. Halogenated plastics such as PVC should be separated from general health care facility waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (e.g. hydrochloric acids and dioxins). **Treatment:** Disposal as part of domestic waste. Food waste should be segregated and composted. Component wastes (e.g. paper, cardboard, recyclable plastics [PET, PE, PP], glass) should be segregated and sent for recycling.
Source: Safe Management of Wastes from Health-Care Activities. International Labor Organization (ILO), Eds. Pruss, A. Giroult, and P. Rushbrook (1999) **Notes:** a. Small quantities only b. Low-level infectious waste only c. Low-level liquid waste only d. Halogenated and nonhalogenated solvents (e.g. chloroform, TCE, acetone, methanol) are usually a laboratory-related waste stream for fixation and preservation of specimens in histology / pathology and for extractions in labs. Note on incinerators. Pyrolytic and rotary kiln incinerators should be used. Use of single-chamber and drum / brick incinerators are not normally considered good practice, except in emergency situations as a last option.	

ANNEX 2: REQUIREMENT FOR OCCUPATIONAL HEALTH AND SAFETY PRACTICES

Each Health Facility is responsible for providing a safe, healthy workplace and safe systems of work for all. The management of waste presents a number of potential hazards to employees requiring the appropriate measure of risk identification, risk assessment, and risk control.
Health care workers have an obligation to follow instructions regarding safe work practices. This section explains their responsibilities and obligations.

2.1 Occupational health and safety provisions

a) Health care waste management plans should include provision for the continuous monitoring of workers' health and safety to ensure that correct handling during segregation, storage, collection, transportation, treatment and disposal procedures of waste are being followed.
b) Essential occupational health and safety measures include the following:
   i. Training of workers on infection transmission.
   ii. Provision of personal protective equipment;
   iii. Establishment of an effective occupational health programme that includes immunization, post-exposure prophylactic treatment, and medical surveillance.

c) Training in health and safety should ensure that workers know of and understand the potential risks associated with health-care waste, the value of immunization against viral hepatitis B among other diseases, and the importance of consistent use of personal protection equipment.

2.2 Employee responsibility

a) Health facility management is responsible to provide appropriate information, education, training and ensuring that safe systems of work are developed and maintained.
b) Key among the responsibilities is to provide information on hepatitis B vaccination among other required vaccinations and a register of vaccinated personnel maintained.
c) Official Rwanda language translations should be provided to workers where necessary.
d) Standard Operating procedures should:
    i. Specify accepted waste management practices, waste segregation procedures and approved waste handling procedures;
    ii. Detail appropriate steps required for waste generators, and handlers;
    iii. Specify personal protective equipment required for waste handling tasks;
    iv. Detail spill management strategies and designate trained personnel for spill management onsite;
    v. Identify first aid resources and needle stick injury treatment protocol; and
    vi. Specify how to operate the information, education, training and safe working systems

2.3 Personal Protective Equipment (PPE)

a) Hygiene Committee/IPC should assess risks and recommend suitable PPE for the nature and degree of the hazard HF staff are likely to be exposed to.
b) PPE must be worn when required.
c) Waste collectors are under obligation to wear appropriate PPE. The risk of spills or splash exposures necessitates the wearing of face and eye protection. Protection of the legs is also required.
d) Carrying of HCW bags is to be minimized and where it cannot be avoided, the waste collector should wear protective garments and apron to minimize the risk of injury.
e) Protective garments should be worn whenever collecting waste, even if the process involves wheeling a securely covered waste trolley to the holding area.
f) The type of protective clothing used will depend on the risk associated with the health-care waste, but the following should be made available to all personnel who collect or handle health-care waste:
    i. Helmets, with or without visors-depending on the operation.
    ii. Face masks-depending on operation.
    iii. Eye protectors (safety goggles)-depending on operation.
    iv. Overalls (coveralls)-obligatory.
    v. Industrial aprons-obligatory.
    vi. Leg protectors and/or industrial boots-obligatory.
    vii. Disposable gloves (medical staff) or heavy-duty gloves (waste workers) - obligatory.
g) Operators of manually loaded incinerators should wear protective face visors and helmets.

h) During ash and slag removal and other operations that create dust, dust masks should be provided for operators.
i) Employees should comply with health care waste management guidelines and SOPs given on correct use of safety and protective equipment for the protection of their own health and safety and the health and safety of others.

2.4 Hygiene Committee

a) The hygiene committee has responsibilities to review:
    i. Monitor and Evaluate provision and installation of facilities and protective equipment;
    ii. Work practices;
    iii. Incidents and accidents;
    iv. Provision and status of information, education and training;
    v. Relevant records;

2.5 Monitoring Hygiene Committee

b) Incident and accident reporting and recording is an essential management information system for identifying causative factors of injuries relating to waste handling.
c) Incident and accident reporting and recording should facilitate costing of associated financial loss and enable management to make injury prevention investment decisions based upon accurate data.
d) Waste treatment, operating and disposal costs should be reviewed periodically to evaluate any fluctuations.

2.6 Hygiene

a) Regular washing and maintenance of equipment used to contain, and transport waste should be done by providing hand-washing facilities (with warm running water and soap) for employees.
b) It is important for health care facilities to promote regular hygiene procedures that comply with the National HCWM Guidelines and SOPs. This is of particular importance at storage and incineration facilities.
c) It may be useful also to designate specific areas for equipment maintenance in hygienic workplaces that are properly equipped with emergency shower rooms and drainage to sewers or septic tanks.
d) Emergency shower rooms should be provided in all health care facilities.

2.7 Precautions for sharps, Blood and Body fluids exposure

Precautions must be implemented to protect against exposure to sharps, blood and body fluids. These precautions include:

a) Providing a purposely designed sharps container as close as practicable to the point of generation of the sharps;
b) Providing appropriate PPE for potential blood and body substance exposures;
c) Conducting compliance checks to confirm that people wear protective clothing;
d) Investigating all incidents to identify causes of exposures
e) Take remedial action to eliminate risks;

f) Hygiene Committee must review incident reports and confirm appropriate action taken;
g) Train staff in first aid and injury management procedures for sharps injury and body substance exposure;
h) Reinforce the need for staff to report all incidents and injuries;
i) Analyze statistics to identify any risk exposure trends for necessary interventions.

Response to injury and exposure

All personnel who handle health care waste should be trained to deal with injuries and exposures. The programme should include the following elements:

a) Immediate first-aid measures, such as cleansing of wounds and skin, and irrigation (splashing) of eyes with clean water;
    i. An immediate report of the incident to a designated responsible person;
    ii. Retention, if possible, of the item involved in the incident;
    iii. Details of its source for identification of possible infection;
    iv. Additional medical attention in an accident and emergency
    v. Alerting occupational health committee, as soon as possible;
    vi. Medical surveillance;
    vii. Blood or other tests if indicated;
    viii. Recording of the incident;
    ix. Investigation of the incident; identification and implementation of remedial action.
b) Waste handlers are particularly at risk from the waste. In all stages they require:-
    i. PPE
    ii. Hold waste containers at the handle or at the top of liner bag
    iii. Avoid any waste falling on the floor during collection and transportation
    iv. Non-complying waste (in terms of segregation) should not be sorted by hand
    v. Waste storage/chamber should be well ventilated and compartmentalized.
    vi. Cloak rooms for changing and showering
    vii. Waste handlers should also receive post exposure prophylaxis for HIV/AIDS

ANNEX 3: WASTE MINIMIZATION, RECYCLE AND REUSE

3.1 Minimization of waste

The preferred management solution is quite simply not to produce the waste, by avoiding wasteful ways of working. To achieve lasting waste reduction (or minimization), the focus should be on working with medical staff to change clinical practices to ones that use less materials. Although waste minimization is most commonly applied at the point of its generation, health-care managers can also take measures to reduce the production of waste through adapting their purchasing and stock control strategies.

3.2 Waste Segregation and packaging

Waste segregation is separation of wastes according to types and categories.

a) Segregation should;
   i. Always be the responsibility of the waste producer,
   ii. Take place as close as possible to where the waste is generated, and
   iii. Be maintained in storage areas, during transportation, treatment and disposal.

b) The most appropriate way of identifying the categories of health-care waste is by **separating** the waste into colour-coded plastic bags or containers. The recommended colour-coding scheme is provided in **Annex 2.**

c) In addition to the colour coding of waste containers, the following practices are recommended:
   i. General (non-infectious) health-care waste can join the stream of domestic refuse for disposal if none can be salvaged.
   ii. Sharps should all be collected together, regardless of whether or not they are contaminated.

d) Sharps containers should be;
   i. Puncture-proof (usually made of cardboard or high-density plastic) and fitted with covers.
   ii. Be rigid and impermeable so that they safely retain not only the sharps but also any residual liquids from syringes.
   iii. To discourage abuse, containers should be tamper-proof (difficult to open or break) and needles and syringes should be rendered unusable.

e) Liner bags used should be;
   i. Highly resistant to puncturing and tearing with exceptional strength and stretch properties.
   ii. They should be of a gauge not less than 150 microns.
   iii. Where bins are unavailable or too costly, containers made of dense cardboard are recommended:
   iv. Bags and containers for infectious waste should be marked with the international infectious substance symbol **(Refer to annex 3).**

f) Highly infectious waste should, whenever possible,
   i. Be sterilized immediately by autoclaving.

ii. It needs to be packaged in bags that are compatible with the proposed treatment process. Red bags suitable for autoclaving are recommended.

g) Waste collection bags for waste types needing incineration shall not be made of chlorinated plastics.
h) Cytotoxic waste, most of which is produced in major hospital or research facilities, should be collectedin strong, leak-proof containers clearly labeled "Cytotoxic wastes".
i) Small amounts of chemical or pharmaceutical waste may be;
    i. Collected together with infectious waste.
    ii. Large quantities of obsolete or expired pharmaceuticals stored in hospital wards or departments should be returned to the pharmacy for disposal.
    iii. Other pharmaceutical waste generated, such as spilled or contaminated drugs or packaging containing drug residues should not be returned because of the risk of contaminating the pharmacy; it should be deposited in the correct container at the point of generation.
    iv. Large quantities of chemical waste should be packed in chemical resistant containers.

Safe reuse and recycling

Medical and other equipment used in a health-care establishment may be reused provided that it is designed for the purpose and will withstand the sterilization process.

a) Proper disinfection and sterilization can ensure the safe use of invasive and non-invasive medical devices. The choice of disinfectant, concentration, and exposure time is based on the risk for infection associated with use of the equipment and other factors discussed in this guideline
b) Reusable items may include certain sharps, such as scalpels, syringes, glass bottles and containers, etc. After use, these should be collected separately from non-reusable items, carefully washed and may then be sterilized by either thermal or chemical sterilization.
c) Plastic syringes and catheters should not be thermally or chemically sterilized; they should be discarded.
d) Other non infectious wastes such as paper, glass, polythene, food remains should be recycled and reused.
e) Other types of wastes not mentioned here are not recommended for recycling or re-use.

3.3 Incineration using the incinerator machine

To ensure optimum combustion conditions, the incinerator must be operating correctly. Proper operation includes separating the waste, weighing it, mixing it for a specified calorific value, and closing the incinerator door once the waste is loaded, and not re-opening it until the burn is complete. Important considerations such as appropriate operator safety training should be completed. It is important to make sure that building and equipment considerations are well planned during the design phase, before installing the incinerator. Incinerator operators should all be trained on use and maintenance of Incinerators. No one is allowed to operate the incinerator without proper training from the Ministry of Health or any other officially contracted company.

3.4 Before incineration and protection of incinerator operators

Before incineration, the incinerator operator and waste handler shall ensure that personal protective equipment are available. These include but not limited to:

- Heavy duty gloves
- Latex Boots
- Goggles/Eye shield
- Head protective Cap
- Apron
- Mask

3.5 Sorting the waste

Before incineration, waste to be incinerated should be sorted according to category:

- Infectious sharp waste should be in safety boxes,
- Infectious non-sharp waste should be in a red colored plastic bag
- Non-infectious waste should be in a black plastic bag.
- Waste to be incinerated should be well stored and protected against rain,

3.6 Weighing the waste

- Using a weighing scale, all waste must be weighed before incineration. Depending on the hourly incineration capacity (CP) of your incinerator (eg incinerators with CP50 have hourly incineration capacity of 50kg, CP60 can incinerate 60kg per hour, CP80 can incinerate 80kg per hour etc). Make sure that the incinerator is not overloaded and/or that Diesel is not being wasted.

3.7 Waste that can be incinerated in incinerator currently present in Health Facilities

- Infectious sharp waste from Medical and Health Facilities (Safety boxes containing Used and/or out of date needles and syringes, Lancets, etc)
- Infectious Non-sharp waste (Expired Pharmaceutical product: Drugs, Medical consumables, leftover blood and other body samples, Anatomical parts, dressing pads, cotton wool
- Non Infectious waste: Paper, empty cans, etc

The following types of waste should be autoclaved before incineration:

- Waste from Medical Microbiology Laboratories and other areas with high potency of aerosol contamination.

- Rubber caps from vials shall be detached from the main vial to avoid accidental explosions that can damage the incinerator and hurt the operator

3.8 Waste that cannot be incinerated in incinerator currently present in Health Facilities

- Cytotoxic drugs
- Carcinogenic drugs
- X-rays film

ANNEX 4. COMMUNITY HEALTH CARE WASTE MANAGEMENT

Community Health is a range of services based on community health outreach and other services provided by Community Health Workers.

4.1 Medical waste generated during Community Health Outreach

a) It is vital that the health facility management ensures clinical wastes are returned to the health facility for appropriate disposal.
b) Waste must be transported in a designated vehicle supplied with a spill kit.

4.2 Sharps management

Safety boxes should be supplied at all sites that generate sharps

4.3 Waste transportation

The following points should be observed:

a) Lids shall be securely fitted to the containers to ensure that the wastes are prevented from spilling;
b) Containers should be thoroughly cleansed and disinfected before re-use;
c) Containers used for the transportation of clinical wastes shall be clearly marked;
d) During transportation, containers holding the wastes shall be securely held inside the vehicle to prevent movement of the containers and spillage of wastes; and
e) The transporter shall ensure that vehicles being used for the transportation of clinical wastes shall be securely locked when left unattended.

4.4 Types of incinerators for health-care waste

Incinerators range from extremely sophisticated, high-temperature operating plants to very basic combustion units. All types of incinerators, if operated properly, should eliminate pathogens from waste and reduce waste to a small volume of ash. Incineration equipment should be chosen on the basis of the available resources and the local situation, balancing the public health benefits of pathogen elimination against the technical requirements needed to avoid the health impacts of air or groundwater pollution from the by-products of waste combustion.

4.5 Incineration of medical waste

This is a process of converting waste into ash under the high temperature (≥ 850oC).
Incineration provides high temperatures and destroys microorganisms; and therefore, is the best method for disposal of contaminated wastes; incineration also reduces the bulk size of wastes to be buried. Simple incinerators like DeMontfort incinerator with double chamber can be built in health centers from locally available materials in refractory bricks. It is important to note that only non-carcinogenic agents should be incinerated. Special measures for the handling of
Management of chemotherapeutic and other radioactive waste should be taken. These measures can be found at the MoH/Environmental Health Desk. Also, only modern and DeMontfort incinerator with 850oC for combustion and 1100oC for post combustion is acceptable in order to avoid environmental pollution.

Three generic kinds of incineration technology are commonly used for treating health-care waste:

dual-chamber starved-air incinerators, which operate in the starved-air mode (below stochiometric conditions) in the primary chamber and are designed to burn infectious health-care waste;

multiple chamber incinerators, including in-line incinerators and retort incinerators used for pathological waste, which operate in the excess-air mode (above stochiometric conditions);

rotary kilns, normally capable of reaching temperatures that break down genotoxic substances and heat-resistant chemicals.

Formalize ongoing training and awareness programs for all appropriate health care facility staff, waste handlers, and home users.

Training is mainly structured around five points, focusing on[7]:

1. Injection safety
2. Stock management and safe injection practices
3. HCWM
4. Communication to change attitudes and advocacy
5. The roles and responsibilities of healthcare and support personnel.

It targets health workers at all levels, waste handlers at health facilities, local communities and personnel of private sector operators.

The MOH's training activities are generally 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 the handling and management of HCW.

Training should also involve private operators and municipal technicians active in maintenance work, cleaning and the management of solid wastes.

Public municipal services assist in collecting solid wastes from some healthcare facilities. Most of collection personnel do not have received any training in HCW that are mixed together in the bins they collect.

The ramifications of this situation concern the exposure of these people to risk of infection, the disposal of solid wastes in illicit household garbage dumps and above all the risks of contamination of the environment by this unsupervised dumping.

4.6 Training all the cooperatives in HCW management procedures:

It is imperative to train the administrative personnel, doctors, midwives, nurses and waste handlers in the District technical departments, managerial staff of town technical departments, the private maintenance and cleaning companies, the waste handlers (orderlies, cleaning personnel and other hospital workers, municipal garbage collectors).

4.7 Evaluating the implementation of the training plan:

Monitoring and follow-up in health facilities must be carried out regularly, to supervise the implementation of the training programs, with the objective of improving the level of HCW management and above all to make sure that good practices are acquired and effective.
Measures must be adopted to identify the risks and prevent future problems. Supervision should concern the selection of HCW, their identification, systems for storing and transportation, Internal processing systems, safety measures, treatment, etc.

Table 7: *List of type of waste and it labeling (Colour, symbol and packaging)*

Waste Category	**Waste sub-category**	**Color – coding**	**Hazard Label/Symbol**	**Container/ Packaging**	
Infectious Waste	None	**Yellow with biohazard sign**	Biohazard symbol 	Heavy duty, leak-proof red plastic bag	
Infectious Anatomical/ Pathological waste (a)	Infectious Human	**Red with biohazard sign **	Biohazard symbol 	Heavy duty, leak-proof red plastic bag	
	Infectious Animal	ORANGE	Biohazard symbol 	Heavy duty, leak-proof orange plastic bag	
Sharps Waste	None	**Yellow – (marked sharps**	The words: "Danger Contaminated Clinical Sharps" in RED text with Biohazard symbol	Puncture-proof, rigid plastic container for sharps	
Chemical Waste	Chemical	**Brown (marked chemicals)**	Use appropriate hazard label 	Sealable, puncture-proof green rigid plastic container	
Pharmaceutical	Pharmaceutical	**Brown (marked chemicals)**	Use appropriate hazard label	Sealable, puncture-proof green rigid plastic container	

					
	Genotoxic / Cytotoxic	**Purple**	Use Appropriate hazard label	Sealable, puncture-proof green rigid plastic container	
Radioactive Waste	None	**Symbol for radioactive waste** 	Use Appropriate hazard label	Contact REMA for further info.	
General Waste	None	Black	None	Good quality black or transparent bag	
Special Waste	Heavy Metal	None	Use Appropriate hazard label	Refer to facility-specific, element-specific SOP	
	Pressurized Containers	Black	Use Appropriate hazard label	Good quality black bag labeled 'waste pressurized containers' or 'waste aerosol dispensers	
	Highly Infectious Laundry	RED	Refer to Rwanda National HCWM Guidelines	Heavy duty leak-proof bag or rigid plastic container	
	Microbial Waste	RED	Biohazard symbol	Fibre board box set lined with heavy duty, leak-proof red plastic bag	
	Food Waste from Isolation Ward	RED	Biohazard symbol	Double-bagged and put into a Fiber board box set lined with heavy duty, leak-proof red plastic bag	
	Amputated Limbs	RED	Biohazard symbol	Double-bagged and put into a Fiber board box set lined	

				with heavy duty, leak-proof red plastic bag	
	Electronic Waste	None	Labeled E-WASTE	Put into boxes, sealed and labeled accordingly.	

Chemical or radioactive solutions containing human or animal anatomical and infectious wastes are considered as chemical or radioactive waste respectively.

Visual identification and segregation

Visual identification is the process of identifying waste at point of generation and segregating it into the appropriate waste category / stream, the categories / streams defined as follows:

Table 8: *Visual identification and segregation of waste*

General Waste	**Infectious Waste**
○ Packaging materials (uncontaminated) ○ Office Supplies ○ Beverage Containers ○ Hand Towels ○ Boxes ○ Glass/Plastic Bottles ○ Food ○ Cardboard ○ Plastic/Cellophane Wrap ○ Cling Wrap ○ Food Wrap	○ Gauze/Dressings ○ Gloves ○ Anatomical Waste ○ Blood ○ IV fluid lines ○ Plastic Forceps ○ O-drape ○ Plastic Container Tray ○ Plastic Apron ○ Alcohol Swab ○ Test Strip
Sharps Waste	**Chemical Waste**
○ Syringes with Needles (no denotching) ○ Infusion sets ○ Scalpels ○ Blades ○ Broken Glass ○ Sutures ○ Lancet ○ Suture	○ Damaged/Unusable Pharmaceuticals ○ Expired Pharmaceuticals ○ Damaged (not broken)/Unusable Injectables ○ Cytostatic/ Chemotherapeutic Drugs ○ Mutagenic, Teratogenic and / or Carcinogenic products or items contaminated with mutagenic,
Special Waste	

○ Mercury ○ Batteries ○ Led ○ Pressurized Cylinders, Cartridges and Aerosol cans. ○ Infectious Laundry ○ Microbial Waste such as Culture Plates, etc. ○ Food Waste From Isolation Wards ○ Electronic Waste	teratogenic and / or carcinogenic products to be discarded ○ Radioactive solutions or products or items contaminated with radioactivity to be discarded. ○ Solid, liquid or gaseous products that are to be discarded that contain dangerous or polluting chemicals.

Table 9: *Technical Requirements for Treatment and Disposal of HCW*

• **Elimination of hazardous characteristics of the wastes**	• Destruction of viable infectious organisms • Destruction of waste/used pharmaceuticals and medicines or transformation into small volume and harmless forms • Destruction of sharps and other materials capable of causing physical injuries • Final disposal or destruction of body parts, tissues, blood, and other organic material • Transformation of wastes into unrecognizable or inoffensive forms
• **Controls on processes**	• Assured long term performance in eliminating the hazardous characteristics • Ability of the treatment and disposal system to cope with variations in waste composition and throughput
• **Controls on processes**	• Assured long term performance in eliminating the hazardous characteristics • Ability of the treatment and disposal system to cope with variations in waste composition and throughput
• **Environmental impacts of system**	• Avoidance or minimization of secondary impacts from disposal system • Prevention of human access and/or scavenging activities • Control of contamination of land, air or water • Avoidance of disease vectors (insects, rodents, etc.)

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