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# HEALTH CARE WASTE MANAGEMENT PLAN

# FOR

# SWAZILAND

MINISTRY OF HEALTH

WORLD BANK

# THIS REPORT

**This HEALTH CARE WASTE MANAGEMENT PLAN is intended to provide a holistic management of all types of waste from the different types of health care facilities in the country.**

**This report contains the findings of a study conducted using the Rapid Assessment Tool developed by the WHO and the plan has been developed on the basis of the local conditions and findings.**

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AIDS | Acquired Immuno-Deficiency Syndrome |
| CBO | Community Based Organization |
| DEH | Department of Environmental Health |
| HCF | Health Care Facility. |
| HCFs | Health Care Facilities. |
| NCDs | Non-Communicable Diseases |
| HepB | Hepatitis B |
| HepC | Hepatitis C |
| HCW | Health Care Waste |
| HCWM | Health Care Waste Management |
| HCWMP | Health Care Waste Management Plan |
| HCGW | Health Care General Waste |
| HCRW | healthcare risk waste |
| HIV | Human Immunodeficiency Virus |
| HSSP | Health Sector Strategic Plan |
| LG | Local Government |
| MCH | XXXX |
| MOH | Ministry of Health |
| MTEC | Ministry of Tourism Environment and Communication |
| NGO | Non-Governmental Organization |
| POA | Plan of Action |
| SEA | Swaziland Environmental Authority |
| STC | Short Term Consultant |
| STI | Sexually Transmitted Infections |
| WB | World Bank |
| WHO | World Health Organization |
| EmONC | Emergency Obstetric and Neonatal Care |

## EXECUTIVE SUMMARY

The Swaziland Government developed a Health Sector Strategic Plan (HSSP) with various facets for addressing the country's health sector challenges. One of the components of this strategy is the Health, HIV/AIDS and TB Project whose objectives are to contribute to the reduction of the HIV/AIDS prevalence and its impacts on the infected and affected people by focusing on building capacity in the health sector. The project will contribute towards delivering adequate health care services to the Swazi population.

Proper management all health care waste is of prime importance as part of the Health, HIV/AIDS and TB Project hence the development of the Health Care Waste Management Plan (HCWMP) for Swaziland.

The development of the Health Care Waste Management Plan (HCWMP) for Swaziland brings a holistic approach to HCWM in the country, that embraces the legal and institutional aspects and also seeks to involve all the appropriate stakeholders in the health sector. Such a Plan is necessary in order to prevent adverse impacts on the environment and to safeguard the health of health care staff and the general public.

Healthcare waste (HCW) is defined as the total waste stream from a healthcare facility (HCF) that includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials. Most of it (**75-90%**) is similar to domestic waste. This fraction referred to as healthcare general waste (HCGW) is made of paper, plastic packaging, food preparation, etc. that haven't been in contact with patients. A smaller proportion (**10-25%**) is infectious/hazardous waste that requires special treatment. This fraction referred to as healthcare risk waste (HCRW) is the one which is of concern at Health Care Facilities (HCF) due to the risks that it poses both to human health and the environment. Poor management of this HCRW exposes healthcare workers, waste handlers and the community to infections, toxic effects and injuries.

This report elaborates on the current status of HCWM in Swaziland, assesses the gaps in technology and information and explores options for solving existing problems. The resultant Health Care Waste Management Plan (HCWMP) sets out the requisite playing field for an effective HCWM programme, starting with a clear legal and institutional framework, appropriate technology, empowered workforce and an enlightened public.

The HCWMP was developed as a result of an assessment of Health Care Waste Management (HCWM) in a sample of the Health Care Facilities of Swaziland. Health care services in Swaziland are provided by three main institutions: the Ministry of Health (MOH) Hospitals; the Mission Hospitals and the Private Hospitals. These Health Care Facilities are divided into eight categories;

1. Referral Hospitals
2. Regional Hospitals

3. Mission Hospitals
4. Private Hospitals
5. Health centers
6. Clinics
7. Public health units
8. Home based care

Other institutions that also generate similar waste are:

- Veterinary hospitals
- Veterinary laboratories
- Pharmaceutical companies
- Blood transfusion companies
- Analytical laboratories
- Research institutions

The country has 511 health care facilities, with 2174 beds and a staff compliment of 4 196 personnel. As part of the preparation of this Plan, the level of health care waste management at the various categories of health care facilities was assessed, together with the associated institutions listed above. This was done by selecting a sample for each category of facility and then carrying out a rapid assessment of the sampled institutions using the Rapid assessment Tool that was developed by the World Health Organization (WHO). The following shortcomings on the HCWM system were observed:

- Non formalization of HCWM in the institutions
- Absence of specific operational policy about HCW;
- Weak HCWM legislative regime
- Absence of standard HCWM operational procedures
- Inadequate budget allocations
- Limited qualified/skilled human resources;
- Technological challenges in handling, treatment and disposal facilities.
- Subdued and insufficient knowledge about HCW (staff and Public).
- Absence of private sector participation

This HCWMP is designed to address the identified shortcomings. The Plan seeks to initiate a process that supports the national response to the shortcomings. It focuses on preventive measures, mainly the initiatives to be taken in order to reduce the health and environmental risks associated with mismanaged health care waste. The Plan also proposes proactive approaches, which, in the longer term will culminate in change of behavior, sustainable HCWM, and protection of the natural environment, health practitioners and the general public against risks of infection.

The HCWMP is organized around the following objectives:

1. To reinforce the national legal framework for HCWM.
2. To improve the institutional framework for HCWM.

3. To assess the HCWM situation, propose options for health care facilities and improve the HCWM in health care facilities.
4. To conduct awareness campaigns for the communities and provide training for all actors involved in HCWM.
5. To support private initiatives and partnership in HCWM
6. To provide/allocate financial resources to cover the costs of health care waste management for health facilities.

The proposed actions should be accompanied by complementary measures, to be initiated by governmental programs, for improving HCWM at all health facilities. The estimated co **US$2 267 500.00** is for institutional capacity development, training, and coordination/monitoring activities, while **US $ 4 100 000.00** is for investments in equipment and supplies to upgrade HCWM at health facility level.

The key principle in health care waste management is that there must be **consistent** regulation and control from the point of generation ("cradle") to the point of final disposal ("grave"), for each waste stream. For this Plan, the relative risk approach was used to determine the treatment systems and technologies suitable for each HCF. Treatment systems and technologies are proposed on the basis of their suitability for the various categories of health care facilities in the country to protect, in the best way possible, healthcare workers and the community as well as minimize adverse impacts on the environment. The following recommendations are made:

- Incinerators with modern technology are recommended for referral hospitals, mission hospitals, regional hospitals, urban health centres, central stores, and the Local Authorities;
- Locally built incinerators (built with local material) in peri-urban health centres, clinics and public health units;
- Stabilized concrete lined pits in rural health centers, clinics, public health units and for home based care.

For the handling of final incineration residues it is recommended that in big cities municipal landfills be used and at regional and local levels, the residues be buried inside health centres or in lined pits, away from patient treatment areas.

The implementation schedule for the HCWMP is for a period of five years. The lead agent, the Department Environmental Health of the MOH, will coordinate the implementation and apply a multi-stakeholder approach to embrace all the relevant players to include the Ministry of Tourism, Environment and Communication (MTEC), Local Authorities, NGOs, and other private sector players.

To ensure that the objectives of the HCWMP are achieved, the implementation of the HCWMP has to be monitored by either internal or external bodies to the MOH. The monitoring body will determine the tools of monitoring. Where weaknesses are observed, the Plan will be revisited and improvements made accordingly.

## 1.0 INTRODUCTION

The Swaziland Government developed a Health Sector Strategic Plan (HSSP) with various facets for addressing the country's health sector challenges. One of the components of this strategy is the Health, HIV/AIDS and TB Project whose objectives are to contribute to the reduction of the HIV/AIDS prevalence and to reduce the impacts of the HIV/AIDS on the infected and affected people by focusing on building capacity in the health sector. The project will contribute towards delivering adequate health care services to the Swazi population.

Management of all health care waste is of prime importance, as part of the Health, HIV/AIDS and TB Project, hence the development of the Health Care Waste Management Plan (HCWMP) for Swaziland. This Plan brings in a holistic approach to HCWM to embrace the legal and institutional aspects and to involve all the appropriate stakeholders in the sector. Such a plan is necessary in order to prevent adverse impacts on the environment and for the safety and health of health care staff and the general public, by preventing injuries and infections from such waste.

### 1.1 Health Care Waste Description

Healthcare waste (HCW) is defined as the total waste stream from a healthcare facility (HCF) that includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials. Most of it (**75-90%**) is similar to domestic waste. This fraction referred to as healthcare general waste (HCGW) is made of paper, plastic packaging, food preparation, etc. that haven't been in contact with patients. A smaller proportion (**10-25%**) is infectious/hazardous waste that requires special treatment. This fraction referred to as healthcare risk waste (HCRW) is the one which is of concern at Health Care Facilities (HCF) due to the risks that it poses both to human health and the environment. Poor management of this HCRW exposes healthcare workers, waste handlers and the community to infections, toxic effects and injuries. Further, if these two basic categories of waste aren't segregated (separated) properly, the entire volume of HCW must be considered as being infectious according to the precautionary principle, hence the importance of setting up a safe and integrated waste management system.

### 1.2 Types and Categories of Health Care Facilities in Swaziland

Health care services in Swaziland are provided by three main institutions: the Ministry of Health and Social welfare (MHSW) Hospitals; the Mission Hospitals and the Private Hospitals. Health services can be divided into eight categories;

- Referral Hospitals
- Regional Hospitals
- Mission Hospitals
- Private Hospitals

- Health centers
- Clinics
- Public health units
- Home based care

### 1.3 Associated Institutions

Other institutions which are associated with and related to these as they generate similar waste are:

- Veterinary hospitals
- Veterinary laboratories
- Pharmaceutical companies
- Blood transfusion companies
- Analytical laboratories
- Research institutions

In total, the country has 511 health care facilities, (excluding the associated institutions) with 2174 beds and a staff compliment of 4, 196personnel.

### 1.4 Assessment of Health Care Waste Management in Swaziland

For purposes of obtaining basic information on the status of health care waste management at the health care centres in Swaziland, the situation at some of the health care facilities, including the associated institutions, was assessed and the level of HCWM analysed. A review of the legal framework on waste management and institutional arrangements was also carried out. The following chapters present the baseline data for Swaziland; a review of the legal framework and institutional arrangements for waste management in Swaziland; analysis of the status of health care waste management at the health facilities;

## 2.0 BASELINE INFORMATION

Swaziland is a small country (17,364sq km), with a population of 1.1 million people and generally of middle-income economic status. The country is divided into four regions, the Hhohho, the Manzini, the Lubombo and the Shiselweni. It has fifty five (55) *tinkundlas*, and 360 chiefdoms.

Seventy eight percent of the population lives in the rural areas; 54% is under 18 years of age; 3% is above 64 years old and 26% consists of women of childbearing age (15 to 49 years)

The Per capita GDP in 2005 was about US$ 2,280 (Atlas method), making it a Category III out of five categories – IBRD country, in the same band as Brazil, China and Thailand. As much as 69% of the population is poor, 48% is ultra poor. The income inequality is severe, with the richest 20% owning 56.3% of the income **(World Bank, 2006)**.

### *2.1 The legal framework*

The Ministry of Tourism, Environment and Communication (MTEC) has the overall mandate in terms of the management of all waste as spelt out by the Environmental Management Act (EMA), 2002 and its subsidiary legislation. Through its agent, the Swaziland Environmental Authority (SEA), the MTEC has published the Environmental Action Plan (1997), the Environmental Audit Assessment (2000), the Solid Waste Regulations (2000) and the National Solid Waste Management strategy (2001). The Environmental Action Plan covers health care waste issues under hazardous waste.

SEA has, however, delegated the day to day management of health care waste to the Department of Environmental Health within the Ministry of Health (MOH) through the National Solid Waste Management Strategy (NSWMS) which set out the national waste management planning framework for the country. According to the NSWMS, MOH is responsible for the preparation of a National Integrated Health Care Risk Waste Plan, which covers health care risk waste from hospitals, clinics, veterinary hospitals etc., but is not responsible for the general waste component from such places. In line with the Strategy, MOH is responsible for preparing guidelines for medical institutions for waste management planning at local level as well.

MOH has several pieces of legislation it applies in its effort to improve Environmental Health. The National Health and Social Welfare Policy embodies the vision and mission of the Ministry of Health (and then Social Welfare) essentially to improve the health and social welfare status of the people of Swaziland by providing preventive, promotive, curative and rehabilitative services (MHSW, 2002). The Policy does spell out the preventive services, but somehow HCWM does not come out as a specific priority in the national health policy.

To achieve the goals of the policy, an interim Strategic Plan has been formulated by the Ministry. The strategy is centered on curative interventions and is silent on Environmental

Health and sanitation issues. To try and address this anomaly, an Environmental Health Policy has since been developed. The policy provides a framework and appropriate guidelines for examining and solving the national environmental health problems in a coherent manner and also highlights HCW as one of the components of environmental health issues (MHSW, 2002).

The legal framework does not define in a clear and precise way the roles, responsibilities and field competency of actors involved in HCWM, nor does it provide internal regulations at the level of the health facility. The present laws and regulations don't provide for standardization of HCW collection, transportation, storage and treatment procedures. To make these legal documents more operational, they must reinforce the technical guidelines for HCWM, prescribe specific regulations for each health facility and describe procedures of control. In addition, the laws and regulations, provide guidelines for the central level of government, but do not provide for Local Authorities to legislate locally through bylaws.

### *2.2 The Institutional Framework*

There are various Acts, Bills and regulations that define shared responsibilities between the Ministry of Health and other stakeholders such as the Ministry of Tourism, Environment and Communication regarding waste management The institutional framework, however, does not provide for other players in this sector. There is no policy document or any formal management procedure for health care waste.

### *2.3 Handling and Treatment of HCW*

The basic information on HCWM that is in place in most of the health care facilities is characterized by a number of deficiencies which include the following:

- Lack of formalization of HCWM issues;
- Non inclusion in budgets;
- Lack of plan or internal procedures;
- No responsible person/team designated to follow up on HCW management;
- Absence of data about HCW production and classification;
- Insufficient appropriate collection materials and protective measures;
- Ageing equipment and infrastructure;
- Lack of systematic segregation of HCW that results in mixing it with household wastes;

### *2.4 Level of Awareness on Good HCWM Practices*

Generally, staff responsible for handling waste throughout the whole chain, i.e. the administrators, head nurses, the waste collectors, the orderlies, and the grounds man are not adequately trained and do not have sufficient knowledge on good HCWM handling and practices.

HCWM systems are thus not well known or adhered to, which very often results in accidents, causing wounds and infection. There is a poor level of knowledge and appreciation of the risk associated with HCW; causing staff to deal with HCW casually and storing it inappropriately.

For the public in general (scavengers, children, and people at landfill sites) knowledge on risks linked with the handling of HCW is very weak. For these actors, it is necessary to develop information and public awareness programmes on risks linked to mishandling of health care waste.

### *2.5 Private Sector Participation*

No private companies are involved in HCWM in Swaziland. Health care waste management is basically the responsibility of hospital staff and the local authorities only. Some of the local authorities that have been tasked with the responsibility to handle HCW do not have the requisite capacities and end up mixing all wastes at the landfill. The absence of the private sector in HCWM poses limitations to availability of professional or better skills and financial resources for managing health care wastes.

The proposed action plan for HCWM supports initiatives to develop a partnership between public and private sector with civil society. To accomplish this, it will be necessary to develop sustainable financial resources for HCWM.

### *2.6 Financial Resources Allocation*

Solid waste management suffers from inadequate financing from the state and local planning authorities. The financial resource allocation at all health care facilities is skewed towards curative approaches to the detriment of HCWM. This is the reason why major constraints are encountered at all stages of the HCWM cycle. Waste collectors are not motivated, equipment is broken down and is hardly replaced, and collections are irregular.

Without a regular budget allocated for HCWM (mainly in health facilities), it is nearly impossible to improve management. Without a sustainable financing mechanism for waste disposal in general, it will not be possible to attract the private sector into playing a greater role for HCWM.

### 2.7 Baseline Data and Information on Health Challenges in Swaziland

Swaziland has one of the highest rates of HIV and TB in the world and is struggling to address one of the worst co-epidemics in Africa. HIV prevalence is at 26% among the sexually active population (15-49 years), with infection rates higher among women (31.1%) than men (19%). HIV prevalence peaks at 49% for women age 25-29, almost five times the rate among women age 15-19 and more than double the rate among women age 45-49.

The number of people living with HIV who need antiretroviral (ARV) therapy is estimated at 58,250. ARV treatment is provided to some 33,000 clients as of the end of 2008. The HIV epidemic has also given rise to a concurrent tuberculosis (TB) epidemic in the country, with recorded new cases rising from less than 1, 500 in 1993 to over 9,600 in 2007. As such, TB has become a major public health problem. It is estimated that HIV co-infection occurs in over 80% of all TB cases. The case detection rate (57%) and cure rate (42%) are respectively lower than the international targets of 70% (detection) and 85% (cure rate). This implies that for every 100 infectious TB cases in Swaziland, only 24 are being successfully found and treated.

HIV-related illnesses have become the major cause of morbidity and mortality among under-5 children. According to the MOH, HIV-related illnesses account for 47% deaths among under-fives. Pneumonia and diarrheal diseases account for 12% and 10% respectively (see DHS). HIV infection could be a contributory factor to the mortality due to pneumonia and diarrheal diseases, whereas limited access to clean water and sanitation, especially in rural areas are indicated as the major direct risk factor. In 2005 mother to child transmission of HIV infections was reported to have been reduced by 1.74% (Government of Swaziland, 2005). Access to PMTCT has been scaled up with the result that by mid 2006 PMTCT services were available in 110 of 154 health facilities. Among sexually related diseases, there is high prevalence of genital ulcer diseases (12% in the 1980s to 60% of all genital ulcers in 2005).

The maternal mortality ratio is 589 per 100,000 live births (2006-7) against a target of 140 per 100,000 live births. Most maternal deaths occur during childbirth and postpartum period; and unsafe abortion is the third leading cause of deaths among women. Under-five child mortality and infant mortality increased during the last decade. The under-five mortality rate is 120 deaths per 1,000 live births. This means that one in every seven children born in Swaziland dies before reaching the fifth birthday. The infant mortality rate is 85 per 1,000 and one-quarter of all infant deaths take place in the neonatal period.

Malaria continues to be a public health problem and is prevalent in the Lubombo Region, where more than 50% of cases occur. It is estimated that 30% of the population is at risk of malaria infection. The country achieved high routine immunization coverage until the late 1990s; however, a fluctuation has been observed in DPT/HEP3 since 2000. Consequently, routine measles immunization coverage was 60% in 2006 while that of diphtheria, pertussis and tetanus (DPT3) was 68%. Evidence also suggests that low immunization coverage combined with paediatric AIDS has reversed the gains that the country had achieved in child survival in previous years.

Non-Communicable Diseases (NCDs) have received inadequate attention, given the serious double burden of disease that prevails in the country. Anecdotal evidence suggests that the country is experiencing an epidemiological transition that has resulted in a serious challenge from both communicable and non-communicable diseases. Cardiovascular diseases especially hypertension, diabetes and various cancers appear to be on the rise. Data on

NCDs is limited; a STEPS survey is currently being undertaken with WHO support to gather baseline epidemiological data on their prevalence in the country.

## 3.0 OBJECTIVES OF THE HEALTH CARE WASTE MANAGEMENT PLAN

The Health Care waste Management Plan is a major component of the main **Health, HIV/AIDS and TB Project.** The main project focuses on building capacity in the health sector and social welfare sector, which will contribute to delivering adequate health care and social welfare services to the Swazi population.

The objective for the development of the health care waste management plan (HCWMP) is to present a level of Health Care Waste Management that will be relevant to help implement and enforce proper health and environmentally sound, technically feasible, economically viable, and socially acceptable systems for management of health care waste during the implementation of the Health, HIV/AIDS, and TB project and beyond on a sustainable level.

The assessment of current health care waste management practices with regard to the handling of health care waste verified both the poor management of waste within hospitals, clinics and other health centres, including home based care, as well as the low level of knowledge among staff and community members about the practices to be adopted and available technologies within the country.

### 3.1 The HCWMP Goal

The goal of the HCWMP is to prevent, reduce and mitigate the environmental and health impacts on health care staff and the general public caused by poor health care waste management (HCWM), through the promotion of best practices and the development of safety standards.

### 3.2 The HCWMP Objectives

The following are the broader objectives for developing the HCWMP:

- To prevent or reduce infections that may arise from poor HCWM
- To mitigate the impacts of HCW on health care staff and the general public;
- To create an enabling legal environment for conducive and effective HCWM
- To establish a sustainable multi-sectoral institutional framework for a well coordinated HCWM in Swaziland.
- Improve services in HCWM by facilitating access to requisite resources

### 3.3 Current Constraints on the HCWM System

The rapid field assessment observed the following constraints on the HCWM system:

- Non formalization of HCWM in the institutions
- Absence of specific operational policy about HCW;
- Weak HCWM legislative framework

- absence of standard HCWM operational procedures
- inadequate budgetary resource allocations;
- limited qualified human resources;
- Technological challenges in handling, treatment and disposal facilities.
- Subdued and insufficient knowledge about HCW (staff and Public).
- Absence of private sector participation

To improve HCWM in a sustainable way, the HCWMP seeks to address these main constraints. It intends to initiate a process that supports a national response to these constraints. It also focuses on preventive measures, mainly the initiatives to be taken in order to reduce risks to the health of the people and the environmental associated with mismanaged of health care waste. The Plan also focuses on the pro-active actions, which, in the longer term, will result in a change of behavior, contribute towards sustainable HCWM, and result in the protection of practitioners against risks of infection.

To achieve this, the proposed intervention strategy is organized around the following measures:

- Organize training activities for actors concerned (health staff, HCW handlers, municipal collectors of wastes, managers of public landfills, etc.);
- Implement information and education campaigns about HCW for the general public;
- Reinforce institutional and technical capacities and improve existing regulations;
- Support partnership initiatives between public, private and civil society in HCWM.
- Develop a comprehensive legislative framework and guidelines

These measures should be accompanied by complementary actionss, mainly initiated by governmental programs, in terms of upgrading HCWM in health facilities.

## 4.0 ANALYSIS OF HEALTH CARE WASTE MANAGEMENT IN THE COUNTRY

The assessment was done over a period of about 10 days through interviews with the main role-players, stakeholders and practitioners and by selecting a sample of health care facilities representative of all categories of facilities available in the country.

By analysing the role of each stakeholder along the HCWM stream it was possible to identify current shortcomings and problem areas and to propose simple, practical actions to be undertaken to solve them.

### 4.1 The Rapid Assessment of the Institutions

The Rapid Assessment Tool developed by WHO was applied to the representative sample of institutions that deal with HCW, ranging from the responsible Government Ministries to a home based care facility.

In total seventeen health care facilities were visited which comprised of private hospitals, mission hospitals and public hospitals in both urban and rural areas in all categories of health facilities..

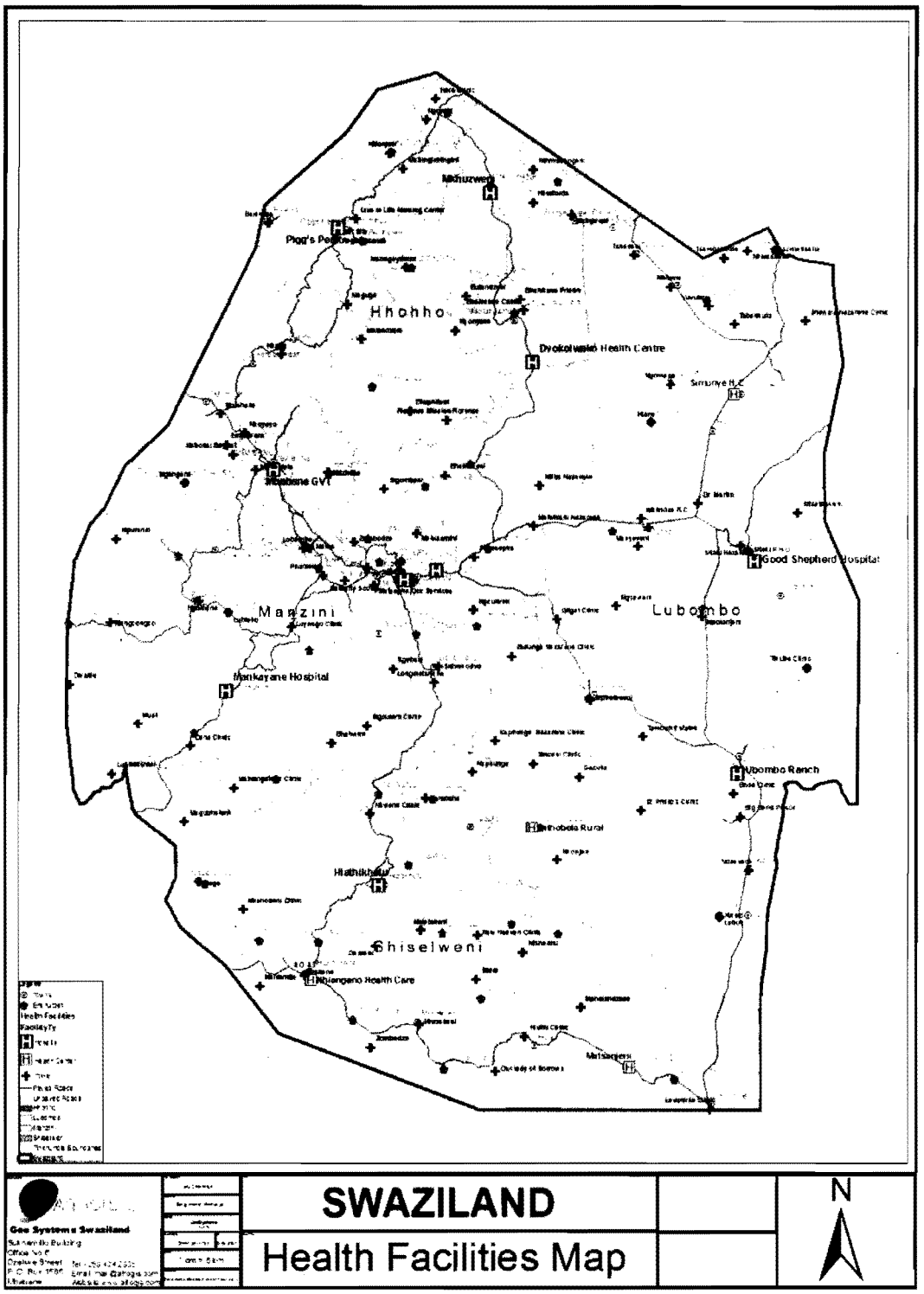
### 4.2 Selection of health care facilities

Table 1 below lists the categories of institutions that were assessed.

**Table 1** List of Institutions that were assessed for HCWM

| NO. | INSTITUTION | NUMBER IN THE COUNTRY | SAMPLE SELECTED |
|---|---|---|---|
| | MINISTRY OF HEALTH AND SOCIAL WELFARE | 1 | 1 |
| | SWAZILAND ENVIRONMENTAL AUTHORITY (SEA) | 1 | 1 |
| | MINISTRY OF LABOUR AND SOCIAL SECURITY | 1 | 1 |
| | WHO | 1 | 1 |
| | REFERRAL HOSPITALS | 1 | 1 |
| | REGIONAL HOSPITALS | 4 | 1 |
| | MISSION HOSPITALS | 2 | 1 |
| | PRIVATE HOSPITALS | 2 | 1 |
| | HEALTH CENTRES | 5 | 2 |
| | CLINICS | 197 | 3 |
| | PUBLIC HEALTH UNIT (OUTREACH) | 170 | 1 |
| | HOME BASED CARE | ----- | 1 |
| | VETERINARY HOSPITALS | 1 | 1 |
| | PHARMACEUTICALS | 1 | 1 |
| | LOCAL AUTHORITIES | 7 | 1 |
| | PRIVATE WASTE MANAGEMENT PLAYERS (EQUIPMENT SUPPLER) | 1 | 1 |
| | ANALYTICAL SERVICES PROVIDERS (LABORATORIES) | 1 | 1 |
| | BLOOD TRANSFUSION COMPANY | 1 | 1 |

**Figure 1** Map of all health care facilities



### 4.4 Analysis of situation

The analysis of the of the facilities assessed revealed the following situation:

- Generally, the level of health care waste management is poor and the responsible agencies currently do not have both financial and human resources to adequately respond to it.
- Most incinerators at health care facilities are not operating efficiently and thus do not treat the waste as expected .
- HCWM has not been institutionalised in the Health Care delivery system and thus it has not been given the attention it deserves.
- HCWM related training has been minimal. However, the Ministry of Health hopes to encourage and support the need for training staff and also raise awareness of the general public.
- The Ministry aims to rope in the private sector it the HCWM arena so that the nation can benefit from the resulting Public – Private Partnership.
- Currently most of the HCWM facilities and infrastructure are old and broken down.
- The legislative framework is old and outdate and also needs to be streamlined
- Roles and responsibilities of the various role-players in HCWM are not clearly defined involve bringing together all the major players and clearly define each other's roles in the HCWM field and then finally develop some sustainable financing mechanism to drive the process forward.

At the health care facilities the following was being assessed:

**a) Waste segregation:**

In all Health care Facilities that were assessed, the waste that is religiously separated from the rest are needles which are placed in designated yellow containers or two litre plastic medicine bottles. The other waste may be segregated into infectious (pink) and non infectious (black) lined bins (Figure 2). However on transportation to the treatment facilities the waste tends to be remixed. In many instances

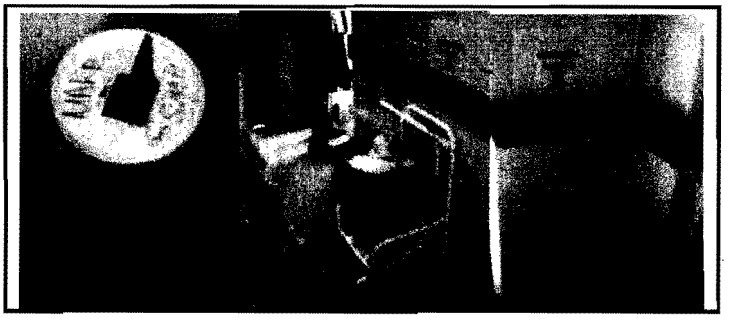


**Figure 2** Segregation of waste at Good Shepherd Hospital

the infectious and non-infectious waste was not segregated and its handling posed serious challenges as it was not properly labelled.

**b) Temporary storage**

Before treatment waste is supposed to be stored under secure conditions (Figure 3). In most health centres there are no appropriate temporary storage facilities and where they are available they are not being used.

**Figure 3** Temporary storage for waste at Good Shepherd

In small clinics where the sharps have to be transported elsewhere for incineration, they are stored in one of the rooms in the clinic until transport is found. At smaller centres which use lined pits it was realised that the sharps containers were being recycled. The needles were being tipped into the pit and the yellow sharps box retained and reused.

**c) Treatment and Disposal of waste.**

**(i) General waste**

In urban areas general waste is land filled (Figure 4) and in rural areas it is burnt in open pits (Figure 5). The large local Authorities like Mbabane have properly constructed landfills. The challenge they are facing is the proper running of the landfill as resources are scarce and the proper maintenance procedures are not followed. There are no official disposal sites in rural areas and each centre has to manage its own waste.

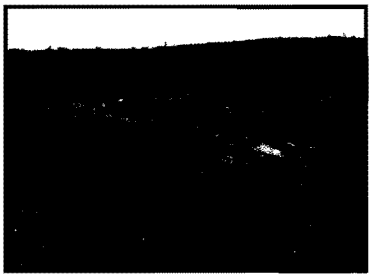


**Figure 4** Mbabane Municipal Landfill.

**Figure 5** Mkhuzweni Health Centre Open pit

**(ii) Infectious waste**

Infectious waste is incinerated (Figure 6) or disposed of in lined pits (Figure 7). Most of the Hospitals have incinerators which in the majority were not working due to lack of maintenance and old age. All Government

**Figure 6 The incinerator at Good Shepherd Hospital**

**Figure 7 The lined pit at Mkhuzweni**

Hospital incinerators could not operate to the recommended minimum temperature of 1 200°C. In smaller facilities the organic infectious waste is disposed of in lined pits .

**(iii) Sharps**

In Hospitals and clinics with incinerators, sharps are incinerated (Figure 6) but in smaller Health Care Facilities sharps are disposed of in lined pits (Figure 8, Annex 4). The pits should be secure and their base must be above the water table. In some instances the pits were not lined.

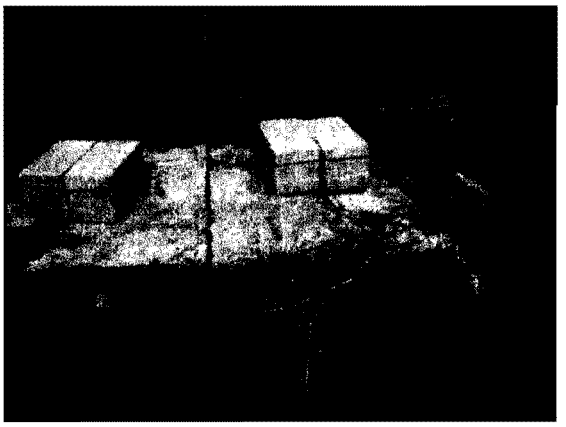


**Figure 8** Concrete lined pit for sharps disposal at Mkulamini Clinic

**d) Sanitation**

Sanitation is either by Pit latrines (Figure 9), septic tank system (Figure 10) or water borne sewage reticulation as in large urban areas. All the Health Care Facilities did not have adequate facilities for the patients and visitors that come to the institutions. The available facilities were either old and dilapidated or broken down altogether. The main problem was lack of maintenance. The existing infrastructure is old and needs replacement in most cases.

**Figure 9** Toilet facilities at Mpolontjeni

**Figure 10** Septic Tanks at Mkhuzweni

**e) Home based Care**

Home based care waste is disposed of in lined pits (Figure 11, Annex 3)

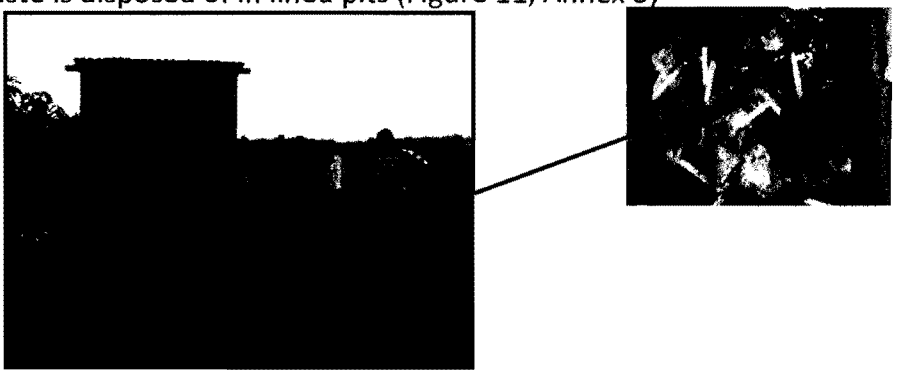


**Figure 11** Concrete lined pit for Home based Health Care Waste

## 4.5 Summary of the analysis

At all the Health Care Facilities issues of concern were noted and the following is a summary of the issues:

**Table 2 Summary of issues found at institutions**

| ISSUE | CATEGORY OF HEALTH CARE FACILITY | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Referral | Regional | Mission | Private | Health Centre | Clinics | Public Health Units | Home Based Care | veterinary | Pharmaceuticals | Local Authorities | Analytical Services Providers | Blood Transfusion Services |
| HCWM not formalised | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| No policies or procedures | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| HCWM not included in budgets | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| No department or staff responsible for HCWM | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| Staff not trained in HCWM | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Accident reporting not happening | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Waste not being weighed | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| HCW handling is not proper | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Consumables like plastic liners always out of stack | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| temporary storage of waste not suitable | ■ | ■ | | | | ■ | ■ | | ■ | | | ■ | ■ |
| Incinerator not functioning properly | ■ | ■ | | | ■ | ■ | ■ | | ■ | | | ■ | |
| Incinerator not secured from public | ■ | ■ | | | X | X | | | | | | | |
| Incinerator poorly located | ■ | ■ | ■ | | | | | | | | | | |
| Incinerator operators not trained | ■ | ■ | ■ | ■ | ■ | ■ | | | | | ■ | | |
| Incinerator operators not protected | ■ | ■ | | | ■ | ■ | | | | | ■ | | |
| Pit not lined or sealed | ■ | ■ | ■ | ■ | | | | | ■ | | | | |
| Final disposal not suitable | ■ | ■ | ■ | ■ | | | | | ■ | | | | |
| Final disposal not secured from public | ■ | | | | ■ | ■ | | ■ | ■ | | | | |
| External players not in place | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Sanitary facilities not sufficient | ■ | ■ | ■ | | ■ | ■ | ■ | | | | | | |
| Sanitary facilities not functioning properly | ■ | ■ | ■ | | ■ | ■ | ■ | | | | | | |

**KEY**

■ Issue affects the facility

Issue does not affect facility

Generally all the Health facilities that were assessed are facing major challenges as far as HCWM is concerned. Three (Mission, Private and Local Authority) out of the thirteen categories reviewed none had any meaningful system in place. All do not have any policies related to HCWM in place and thus have not formalized it. HCWM is not budgeted for and no staff have been trained in HCWM.

Only the Mission Hospital, Private Hospital and the local authority have departments or staff designated to this function and have a functioning system of reporting accidents with some reasonable HCW management in place. Also their incinerators are in good working conditions and well maintained. All the government incinerators and other equipment and treatment facilities are in a serious state of disrepair and thus inefficient. They are also poorly located in between residential housing. Also the sanitary facilities are generally not sufficient and not working at the government institutions

Only the local authority weighs its waste and generally the final disposal facilities leave much to be desired. The pits are not lined, mostly they are open pits and not secure, exposing the scavenging communities to infections. The facility operators are in most cases not trained and do not have proper protective gear in addition to the consumables like the plastic liners which are always out of stock

### 4.6 General Recommendations

To alleviate the current low level of Health Care Waste Management in the country, the following recommendations can be made:

1. It is recommended that the following legal instruments be developed:
    a. HCW Policy,
    b. HCW Regulations
    c. Finalization of technical guidelines
    d. Standard operating procedures

2. HCWM be institutionalized and formalized in all Health Care facilities by making it mandatory that:
    - HCWM is included in Budgets
    - Staff are assigned to this function
    - Records are kept of this activity
    - Control flow of HCW is maintained in institutions
    - Regular reporting on HCWM issues at all institutions
    - Accident reporting protocols be adhered to strictly

3. The health care facilities must be provided with adequate HCW handling equipment
    a. Color coded bins and liners

**b.** Correct sharps boxes
**c.** Full protective gear

4. The health care facilities be provided with the appropriate treatment facilities that match the status of the facility. In general the major items like incinerators be centralized at major Local Authorities and these include;
   1. Mbabane City Council
   2. Manzini City Council
   3. Mankayane Town Board
   4. Pigg Speak Town Board
   5. Siteki Town Board
   6. Nhlangano Town Board
   7. Ezulwini Town Board

   All facilities within the Local Authority area and any other health facility that will be close will be encouraged to use these facilities.

   The allocation of treatment facilities can be as follows:

**Table 3** Types of Treatment Facilities for each Category of Health Care facility

| No. | Treatment facility | Institutions | Quantity |
|---|---|---|---|
| 1.0 | modern Pyrolitic incinerator | • Referral Hospital,<br>• Three Regional Hospitals,<br>• four Health Centres,<br>• ten clinics<br>• The Central Medical Stores, and<br>• Seven Major Local Authorities | 26 |
| 2.0 | local material incinerators | • health centers,<br>• clinics and<br>• Public Health Units. | 500 |
| 3.0 | stabilized concrete lined pits | • rural health centers,<br>• Clinics,<br>• Public Health Units and<br>• home based care | 200 |

5. The treatment facilities be located at or relocated to appropriate places that minimize interference with communities. If there is no space at the health facility consideration should be given to establishing the facility offsite and allow private players to run it
6. The capacities of the treatment facilities must be correctly assessed and the correct facility be provided for the different health care facility categories and types.
7. Particular attention must taken to ensure that the final disposal method being employed completely eliminates the possibilities of infections or poisoning.
8. HCWM Training programmes for trainers, medical staff, General staff, supplies staff and any other staff of related fields should be embarked on and pursued vigorously.
9. HCWM awareness raising campaigns should be developed and utilize the following:

- Televised messages
- Radio messages
- Posters in Health centers
- Public animation sessions

10. Private players be encouraged to take part in the HCWM programmes in order to access the Public-private partnership programmes.
11. A system be put in place to monitor and evaluate the progress of implementation of the HCWMP.

## 5.0 TRAINING NEEDS ASSESSMENT

From the general assessment of the Health Care Facility conducted with the rapid assessment tool critical training requirements were noted.

Correct attitudes for effective HCWM result from knowledge and awareness regarding the potential risk of healthcare and administrative procedures for handling the waste. Apart from a general understanding of the requirements of waste management, each category of actors (doctors, nurses, caretakers, ward attendants, ground workers, administrative staff, etc.) working within the health facility has to acquire his or her own individual waste management skills. Staff must be taught and trained in HCWM approaches. For the training to be successful and to lead to changed behaviour, participants must become aware of the risks linked to HCWM.

The training needs were assessed taking into consideration the two broad groupings, Health Care Facility staff and General Public or non Health Care staff. Both groups displayed certain levels of ignorance which may be solved by training and awareness raising:

### 5.1 Training Needs for Health Care staff

This group includes:

(i) Management and administrative staff;
(ii) Medical and laboratory staff;
(iii) ward attendants, caretakers, ground workers and
(iv) other support staff;

**i) Management and administrative staff**

It is the task of the management to build up the awareness of waste management in each type of health facility. The survey revealed that at times the management itself was not totally aware of all the risks resulting from HCW, and in many cases did not know much about appropriate waste management technologies and procedures.

**ii) Medical and laboratory staff**

Due to their professional training, doctors, nurses and the other medical staff have the broadest knowledge about health risks resulting from HCW. They, in turn, should create awareness among the other members of health facility staff. However although, they may be aware of the health risks, doctors, nurses and other medical staff displayed a need for training in proper waste management and handling technologies and procedures as these are not their speciality.

### iii) Ward attendants, ground workers, caretakers and other support staff

Ward attendants, ground workers, caretakers, cleaners, kitchen and laundry personnel constitute the group of people having the greatest daily contact with HCW and the least knowledge about health risks or waste management practices. The assessment revealed a serious lack of appreciation of risks associated with their tasks. Therefore, they need extensive training and regular supervision to ensure the desired improvement in waste management practices actually occurs.

The following are the needs which were identified for the Health Care Facility staff:

**Table 4** Topics for training and public awareness -Health Staff

| TRAINING SUBJECT | CATEGORY OF TARGET GROUP | | | |
|---|---|---|---|---|
| | A | B | C | D |
| **Basic knowledge about HCW** | | | | |
| Waste categories | X | X | X | |
| Hazardous potential of certain waste categories | X | X | X | X |
| Transmission of nosocomial (hospital acquired) infection | X | X | | |
| Health risk for health care personnel | X | X | X | |
| | | | | |
| **Proper behaviour of waste generators** | | | | |
| Environmentally sound handling of residues | X | X | X | X |
| Waste avoidance and reduction possibilities | X | X | | X |
| Identification of waste categories | X | X | | |
| Separation of waste categories | X | X | | |
| Knowledge about appropriate waste containers | X | X | X | |
| | | | | |
| **Proper handling of waste** | | | | |
| Adequate waste removal frequency | X | | X | |
| Safe transport containers and procedures | X | X | X | |
| Recycling and re-use of waste components | X | | X | |
| Safe storage of waste | X | | X | |
| Cleaning and maintenance of collection, transportation and storage facilities | X | | X | |
| Cleaning and maintenance of sanitation facilities, drains and piping | X | | X | |
| Handling of infectious laundry | X | | X | |
| Handling of chemical and radioactive waste, outdated drugs | X | X | X | |
| Maintenance of septic tanks and other sewage treatment facilities | X | | X | |
| Maintenance and operation of incinerator for infectious waste | X | | X | |
| Maintenance and operation of waste pit and landfill site | X | | X | |
| Safety regulation in waste management, protective clothing | X | X | X | |
| Emergency regulations in waste management | X | X | X | |
| | | | | |
| **Establishment of a waste management system** | | | | |
| Establishment and implementation of a waste management plan | X | | | |
| Sampling of waste quantities, monitoring and data collection | X | X | | |
| Monitoring and supervision of waste management practices | X | X | X | |
| Cost monitoring of waste management | X | | | |
| Establishment of a chain of responsibilities | X | X | X | |

| TRAINING SUBJECT | CATEGORY OF TARGET GROUP | | | |
|---|---|---|---|---|
| Set-up of occupational safety and emergency regulations | X | X | X | |
| Interaction with Local Authorities or private sector waste handling structures | X | | | |
| Public relation and interaction with local community | X | | | |
| | | | | |

**A** : Management and administrative staff
**B** : Medical and laboratory staff
**C** : Ward attendants, caretakers, ground workers and other support staff;
**D** : Patients and visitors

## 5.2 Training Needs for the General Public/non Health Care y staff

This group includes:

(i) Patients and visitors
(ii) Contracted workers
(iii) Private players
(iv) Suppliers

### i) Patients and visitors

Due to the permanent fluctuation of patients and visitors, it is virtually impossible to teach this group of people systematically about the principles of HCWM. One possibility may be to offer advice on basic HCWM subjects during the waiting periods. Patients and visitors should be made aware of the proper use of waste containers to dispose of their waste. Attentive hospital staff might guide patients and visitors from time to time regarding their waste management practices. Relevant posters may often provide the public with additional information.

### ii) Waste Management Operators

The waste operators have a daily and direct contact with HCW because they are mainly responsible for waste handling. For this reason, they need to be informed on risks and be advised about infection prevention and security protection.

### vi) Waste Transportation Staff

Waste transportation staff (mainly off-site transportation) were observed to be very casual about HCW and treated it like general waste. They need to be trained because HCW should be collected in specific containers and specific vehicles. In addition, procedures for HCW handling (loading and unloading) need to be understood because of the special characteristics of HCW, and because handling and transport require specific protection equipment to prevent infection by HCW.

### vii) Treatment Systems Operators

HCW treatment systems operators require specific capacities. In all facilities visited this was seriously lacking and the operators were just picked at random. The operators in charge need to be trained in order to master the operating process, to know health and security related to the operating system (mainly the procedures in emergency cases), to learn how to care for the equipment.

### viii) Disposal Managers

The staff (municipal staff) who manage landfill disposal sites need to be informed about health and security linked to HCW. At the visited sites the managers were handling HCW like any other waste. They need to be aware of the necessity of protection equipment and personal hygiene and they must control scavenging activities and recycling of used instruments inside these specific sites.

The following are the training needs which were identified for the non Health Care Facility staff:

**Table 5** Topics of training and public awareness guide (Non-Health Facility Staff)

| TRAINING SUBJECT | CATEGORY OF TARGET GROUP | | | |
|---|---|---|---|---|
| | E | F | G | H |
| **Basic knowledge about HCW** | | | | |
| Waste categories | X | X | X | X |
| Hazardous potential of certain waste categories | X | X | X | X |
| Transmission of nosocomial (hospital acquired) infection | X | X | X | X |
| Health risk for health care personnel | X | X | X | X |
| | | | | |
| **Proper behaviour of waste generators** | | | | |
| Environmentally sound handling of residues | X | X | X | X |
| Waste avoidance and reduction possibilities | X | X | X | X |
| Identification of waste categories | X | X | X | X |
| Separation of waste categories | X | X | X | X |
| Knowledge about appropriate waste containers | X | X | X | X |
| | | | | |
| **Proper handling of waste** | | | | |
| Adequate waste removal frequency | X | X | | |
| Safe transport containers and procedures | X | X | | |
| Recycling and re-use of waste components | X | X | X | X |
| Safe storage of waste | X | X | X | X |
| Cleaning and maintenance of collection, transportation and storage facilities | X | X | X | X |
| Cleaning and maintenance of sanitation facilities, drains and piping | X | | | |
| Handling of infectious laundry | X | X | | |
| Handling of chemical and radioactive waste, outdated drugs | X | X | | |
| Maintenance of septic tanks and other sewage treatment facilities | X | | | |
| Maintenance and operation of incinerator for infectious waste | X | | X | |
| Maintenance and operation of waste pit and landfill site | X | | X | X |

| TRAINING SUBJECT | CATEGORY OF TARGET GROUP | | | |
|---|---|---|---|---|
| Safety regulation in waste management, protective clothing | X | X | X | X |
| Emergency regulations in waste management | X | X | X | X |
| | | | | |
| **Establishment of a waste management system** | | | | |
| Establishment and implementation of a waste management plan | X | | | |
| Sampling of waste quantities, monitoring and data collection | X | | | |
| Monitoring and supervision of waste management practices | X | X | X | X |
| Cost monitoring of waste management | X | | | |
| Establishment of a chain of responsibilities | X | X | X | X |
| Set-up of occupational safety and emergency regulations | X | | | |
| Interaction with Local Authority or private sector waste handling structures | X | | | X |
| Public relation and interaction with local community | X | | | X |
| | | | | |

**E : Waste management operators**
**F : Waste transportation staff**
**G : Treatment systems operators**
**H : Disposal managers**

## 5.3 Training Strategy

The training program should aim to operationalize the HCWMP by: promoting the emergence of experts and professionals in HCWM; raising the sense of responsibility of people involved with HCWM; and safeguarding health and security of health staff and waste handlers. The training strategy will be articulated around the following principles:

- **Training trainers**:
  This involves training the senior officer in health centres (doctors, EHO, and technical services' supervising staff in Local Authorities). The training sessions will be held in each Region, (10 trainers per Region, during 5 days, nearly 600 person/day) ;

- **Training health care staffs in health centres (medical staff, nurses)**,
  This should be done by the already trained senior staff members. ( 40 participants for each region, during 3 days, nearly 3000 person/days);

- **Training HCWM supporting staffs**
  All support staff (ward attendants', ground workers, cleaners) will need this training. These training sessions will be held in each health centre and will be performed by already trained key staff (3000 person/days, with 3 agents during 2 days, for nearly 200 health facilities).

The training modules will deal with risks in the handling of HCW : sustainable management process (collection, storage, transportation, treatment, disposal) ; good behaviours and

practices ; caring for installations ; protection measures. The training of medical and paramedical staff remains a priority if the program is to have a major impact on HCWM. The recommended content of these training modules is presented below:

**Training module for waste management operators**

- Information on the risks; advice about health and security
- Basic knowledge about procedures of wastes handling, including the management of risks.
- The use of protection and security equipment.

**Training module for waste transportation staff**

- Risks linked with waste transportation;
- Procedures for waste handling: loading and unloading;
- Equipment such as vehicles for waste transportation;
- Protection equipment.

**Training module for treatment systems operators**

- treatment and operating process guidelines;
- health and security related to the operating system;
- procedures in emergency cases and help;
- technical procedures;
- caring for equipment.
- control of waste production;
- watching over the process and the residues.

**Training module for disposal managers**

- Information about health and security
- Control of scavenging activities and recycling of used instruments;
- Protection equipment and personal hygiene ;
- Secure procedures for the management of wastes at the disposal site ;
- Measures concerning emergency cases and help.

**Training modules for HF staff**

**Administrative staff**

- Information on the risks
- Advice about health and security
- Basic knowledge about procedures of HCWM; collection, storage, transportation
- treatment and final disposal including the management of risks.
- The use of protection and security equipment
- Health care waste management guidelines
- Financial resources to be allocated to HCWM.

**Doctors, clinicians, nurses, midwives, etc.**

- Information on the risks; advice about health and security
- Basic knowledge about procedures of HCWM waste collection, storage, transportation, treatment and final disposal including the management of risks.
- The use of protection and security equipment (protective clothes)
- Strategies to control and ensure that used disposable equipment/materials are placed in appropriate disposal and collection facilities and to ensure that all patients are safe from injury or hazards resulting from HCW
- HCW segregation at source
- How to orient the staff on the guidelines for waste management
- Good practices on HCWM

**Cleaners, ward attendants, grounds attendants, other personnel in touch with waste, etc.**

- Information on the risks; advice about health and security
- Basic knowledge about procedures of HCWM waste collection, storage, transportation, treatment and final disposal including the management of risks.
- The collection and transportation of HCW containers
- The use of protection and security equipment (protective clothes)
- Good practices on HCWM

### 5.4 Public Awareness Strategy

The awareness raising strategy will aim at the general public and scavengers. They must be informed about dangers associated with HCW handling. This objective can be achieved through information and awareness campaigns on local radio (120 messages, 2 message per month, during the 5 years period) and television (30 messages, 6 messages per year, during the 5 years period), but mostly, by animation sessions in popular MTECs, organized by NGOs and CBOs active in health and environment management (nearly 120 animations, 30 per region x 4 regions). These actions can be reinforced by education campaigns (1000 posters, 20 unit for 500 health facilities) in health facilities in other highly frequented places.

Another concern is to ensure that HCW from home care are well-managed. In fact, advances in medicine now allow monitoring family health and treating some sickness at home. Such activities have the effect of introducing infectious wastes closer to households. These health care wastes include: used razor blades, needles, syringes and lancets, medicine unused or outdated, broken thermometers, etc. These must be managed at home where health care is practiced, to avoid their mingling with household wastes and increasing hazardous risks. It is therefore necessary to elaborate information and awareness programs through most forms of media (newspapers, flyers, radio, television, etc. ) towards the health agents (professionals, traditional, and family members) who exercise in the home. The targeted actors must be advised to have specific containers for needles, sharp objects (box, empty bottles, etc.) and other HCW (cotton, gloves, bandages, etc.) and not to mix the HCW with the general household or office wastes.

Used needles, syringes, lancets and other sharps may be safely disposed with other home solid wastes, provided that special care is taken while packaging them. The safe packaging of these wastes may be done very simply at home : one can use rigid plastic bottles (with a tight fitting lid), such as empty laundry detergent bottle; and one must not put sharp objects in any container to be recycled or returned to a store; needles and syringes don't need to be recapped. The rigid bottle will minimize possible needle pricks and when they are full, the lid should be tightly fixed and the bottle placed with other solid waste for disposal.

Unused and outdated medicines stored at home are considerable risks for children and careless people. These medicines may be safely disposed by throwing them into a flushing toilet. A thorough cleansing of empty medicine containers with warm water should then be done. After that, close the lid tightly and dispose with other home solid waste. Medicines should be out of reach of children who should not play with unclean empty medicine containers.

Contaminated bandages, pads, gloves, etc., may be double bagged in standard plastic waste bags and securely fastened. This material may then be combined with other household waste for disposal.

Condoms are not considered as Health Care Waste (they are protective materials against HIV/AIDS infection). It is possible, in the programs for public awareness raising, to draw people's attention to the necessity of managing these wastes well: condoms should not be dropped anywhere; after use, they should be disposed of by throwing them into flushing toilets, burying them safely, or double-bagging them in standard plastic waste bags (securely fastened) for combination with other household waste disposal.

Health agents (both formal and informal) who practise at home care facilities must have collection containers, which they should carry to the nearest health centre for treatment and disposal. They should also have sterilizing products in order to sterilize all the HCW before disposal. The needles must be buried; if not, they must be put into bottles or other closed boxes, then evacuated to the public landfill (or health care facility). Other HCW (cotton, gloves, bandages, etc.) could be disposed in the public landfill after sterilization. Gloves should be torn to prevent people from re-using them and risking infection.

## 6.0 THE HEALTH CARE WASTE MANAGEMENT PLAN (HCWMP)

The following is an outline of the proposed HCWMP for Swaziland:

**OBJECTIVE 1 : REINFORCE THE NATIONAL LEGAL FRAMEWORK FOR HCWM.**

The legal framework needs to be improved. In particular, it is necessary to set up a legal regime that spells out the illegality of mismanaging HCW, legal requirements for all persons in the HCW field, including codes of practices and method of enforcement of the requirements.

**Strategy:**

- **Developing a national policy for HCWM**
  Several Policy documents have been formulated by the Ministry of Health, with positive impacts towards health care waste management but without specifically tackling the subject matter. These include the National Health Policy and the Environmental Health Policy. Although the Environmental Health Policy provides a framework and appropriate guidelines for examining and solving the national environmental health problems, HCW is not exhaustively dealt with. It is therefore necessary to develop a policy specifically for HCW.

- **Creating, consolidating, reviewing and updating laws, bylaws and regulations related to HCWM**
  HCWM is currently weakly dealt with in various pieces of legislation and a thorough reviewing and consolidation is necessary to bring the whole legal basis for HCWM up to speed with the current developments in the country. The legal update should result in a law that includes the following: a clear definition of roles and responsibilities of such institutions as the MTEC, SEA, and MOH, a clear and properly categorized definition of hazardous waste; detailed legal requirements for all persons who are producers, carriers, or who are engaged in the treatment and disposal of hazardous HCW so as to prevent harm to human health or pollution of the environment; the methodologies for record keeping and reporting; a regulatory system for enforcing the law; the penalties applicable to offenders; and the designation of the law courts where cases will be tried.

  The legal system must be laid out in such a way that at each Health Care Facility, the HCWM will be regulated as follows:
  - The roles and responsibilities for HCWM will be defined;
  - An internal HCW management plan is established and implemented;
  - An office responsible for monitoring the HCWM plan is designated;
  - The treatment system for the Facility is defined and known;

- Financial provision for HCWM in the health centers budget is scheduled and assured;
- Procedures of positive and negative sanctions for staff, according to their involvement in HCW management are adopted and implemented.

- **Finalise the development of technical guidelines for HCWM**
  The Ministry has produced a comprehensive zero draft of the National Health Care Waste Management Guidelines. With the information gathered from the rapid assessment programme and any other thorough assessment the document should be fine-tuned to cater for the situation on the ground. The technical guidelines should be practical and directly applicable, and include the following specifications, with a sufficient degree of detail : legal framework covering safe health-care waste management; hospital hygiene and occupational health safety; limits on emissions of atmospheric pollutants and releases into water resources; responsibilities of health-care facilities, health-care waste producers, and public waste disposal agencies; safe practices for waste minimization; segregation, handling, storage and transport practices of health-care waste; recommended treatment and disposal methods for each health-care waste category and waste water.

- **Establishing control procedures for HCW management within all institutions generating and handling HCW**
  Because of lack of any procedures information about any activity at the Health Care Facilities is hard to come by. This then makes planning a very difficult process as no baseline data can be availed. The following can assist bring about control and maintenance of records:
  - Elaborate specific EIA guidelines for waste management, including HCW;
  - Implement clear directives for health control agents;
  - Set up a register for HCW quantities produced by health centers;
  - Define the mechanisms of control in needles and sharps collection and disposal process ;
  - Organize regular monitoring by technical staff in Provincial and Region Health Departments.

**OBJECTIVE 2 : TO IMPROVE THE INSTITUTIONAL FRAMEWORK FOR HCWM**

The institutional framework needs to be carefully worked on and improved. In particular, it is necessary to set up a structure to coordinate and to follow up the POA and to develop specific technical guidelines for the health centers in terms of definition of responsibilities and setting standards and norms for good HCWM practices (e.g., reduction, selection and separation at source), and procedures for storage, handling, transformation, treatment and disposal.

**Strategy:**

- **Defining and harmonizing the duties and responsibilities of each actor involved in HCWM process at all levels.**
  The various actors in HCWM are not sure of their parameters and limits to the extent that functions tend to overlap, causing confusion to the clients and at times leaving gaps as people will be unsure whose responsibility it would be. A roundtable of all the players is thus needed firstly to **sensitize them on the Rapid Assessment findings** and then agree on the roles and responsibilities of each player.

- **Establishing of Taskforces/Working Groups (coordination structures) on health care waste management at National level**
  This structure would include all the actors involved in HCWM (MOH, MTEC, NGOs, Local Authorities, Health facilities, etc.)

- **Facilitating the establishment of inter-sectoral taskforces/working groups and focal points at all operational levels**
  A similar structure to the national level structure must also be established at operational levels, i.e. a structure which includes all the actors involved in HCWM (MOH, MTEC, NGOs, Local Authorities, Health facilities, etc.)

- **Creating awareness and lobbying for support for the HCWM program**
  Generally HCW is treated as general waste and the risks associated with it are not taken into consideration. It is thus imperative that awareness levels be raised to acceptable levels and that support be garnered at all possible levels for this program to the extent of being included in national budgets

- **Conducting operational research and development related to HCWM**
  There are a lot of grey areas in the field of HCWM especially in the area of disposal. It would be worthwhile to at least support one operational research every year. This would go a long way in opening up a once dark and stigmatized field.

- **Developing of Monitoring and Evaluation plan**
  Implementation of HCWM plans needs to be monitored and evaluated in order to assess success of the program. **Monitoring and Evaluation** tools need to be developed and surveillance be undertaken.

**OBJECTIVE 3 : TO ASSESS THE HCWM SITUATION, PROPOSE OPTIONS FOR HEALTH CARE FACILITIES AND IMPROVE THE HCWM IN HEALTH CARE FACILITIES.**

The Health care waste management system in the country is generally at its lowest ebb, but the extent of deterioration needs to be more thoroughly assessed using a well stratified sample of all the Health Care facilities in the country and then derive the best technical options for HCW segregation, collection, containment, storage, transportation, and disposal according to type of HCW and size and location of Health Care Facility.

The provision of infrastructure and equipment must be attached to strict directives and guidelines that must be adhered to in implementing the programme. A centralized approach in which major equipment is centralized at Municipalities, will help reduce the equipment requirements as the surrounding facilities can all use one set of treatment facility.

**Strategy :**

- **Carrying out a National Inventory of Health Care Facilities {HCFs} to help establish the HCWM situation in the country.**
  A well stratified sample of all the health care facilities in the country must be taken and assessed to ascertain the true picture of current status of HCWM.

- **Choosing the best technical options for HCW segregation, collection, containment, storage, transportation and disposal according to (a) type of HCW (b) the size and location of the HCF.**

- **Implementing pilot projects before settling up the HCWMP.**
  Before full scale implementation of the HCWMP so developed it is advisable to carry out pilot programmes to test the feasibility of the proposed plans of action.

- **Providing infrastructure, materials and equipment to HCFs based on conditions on site.**
  Each Health care Facility requires a different approach to handling HCW. This must be assessed correctly and the best practicable option determined. This will be cost effective and will provide each institution with exactly what it needs:
  - Supply the health facilities with collection and storage materials;
  - Implement an efficient HCW treatment system (for example modern incinerators for Municipalities, central and Region hospitals; local incinerators in health centers and health posts);
  - Install liquid waste treatment systems in health facilities (septic pits/tanks with a chemical disinfection system for the provincial hospitals, Region hospitals and health centers; as for central and general hospitals, a physical and chemical treatment is recommended);
  - Operate systematic HCW segregation procedures.

Note: The health centers should be supplied specific boxes for needles and other sharp objects. Already used empty bottles (flacons, mineral water bottles, etc.) could replace these boxes. Plastic containers for temporary storage should be supplied to health care rooms.

- **Ensure appropriate protection equipment to health staff**
  HCW handling is risky business and those involved in it must be properly protected. All necessary protective gear must be availed to them to protect them as they carry out their duties.

**OBJECTIVE 4 : TO CONDUCT AWARENESS CAMPAIGNS FOR THE COMMUNITIES AND PROVIDE TRAINING FOR ALL ACTORS INVOLVED IN HCWM**

The general public is unaware of the risks associated with HCW and worse still when it is mixed with general waste which they target for scavenging. A serious awareness drive must be targeted at the general public to raise their awareness as they are in danger of handling infectious and toxic wastes unawares.

Awareness programs for the general public should mainly be aimed at scavengers, children playing on the landfills, population performing or receiving home health care, those using recycled objects, and people living near the landfills. NGOs and CBOs enjoying a large experience in community communication and health activities would be best suited to conduct them.

The staff members of Health Care Institutions also require training so that they can handle HCW appropriately so that they do not expose themselves and the general public to infections.

**Strategy :**

- **Inform population of dangers linked with bad HCW management practices**
  - messages on television (about dangers related to the handling of HCW);
  - radio messages (mainly in local languages);
  - National awareness raising campaign (posters in health facilities, billboards, monthly public animation sessions in the Regions).

- **Inform population of dangers linked to scavenged HCW materials**
  - messages on television (about dangers related to the handling of HCW);
  - radio messages (mainly in local languages);
  - national awareness raising campaign (posters in health facilities, billboards, monthly public

- **Inform home-based care givers / traditional healers of risks linked to improper HCW handling**
  For more detailed information on the target groups and content of the proposed public awareness programs, please see Chapter 5 on Training needs analysis.

- **Conducting awareness campaigns on proper handling of HCW**
  Properly structured and planned, targeted awareness campaigns need to be carried out to raise the level of awareness about risks associated with HCW, of all sections of the society to acceptable levels

- **Elaborate training programs and Train trainers**
  - Identify the training need and the groups to be trained in the health facilities;
  - Train trainers.

- **Organising training programmes for all actors involved in HCWM with special emphasis on medical and non medical staff**
  - Train health staff in health facilities (doctors, nurses, midwives), health and sanitation technical teams at Region level, municipal technical services supervisors;
  - Train waste handlers in health facilities (ward attendants, ground workers, cleaners, etc.).

  For more detailed information on the target groups and content of the proposed training programs, please see Annex 2.

- **Evaluate training program implementation**
  - HCW monitoring in health facilities should be carried out regularly, in order to improve waste management and to ensure that good practices are actually performed after training. Measures should be adopted to ensure that problems and risks involved are identified while enhancing safety and preventing the development of future problems. Supervision should concern the following : segregation, collection routines and labeling, internal treatment system, internal storage of HCW, transportation, worker safety measures, disposal at sanitary landfill, etc.
  - In addition to this, it is recommended to update pedagogical references of training institutions in medicine, midwives and nurses schools, by integrating HCWM issues in their pre-service training programs.

**OBJECTIVE 5 : SUPPORT PRIVATE INITIATIVES AND PARTNERSHIP IN HCWM**

The private sector and other private individuals are currently not involved either in solid waste management or HCWM. Supporting the private sector to participate will be beneficial to the system as this will ensure injection of private sector funds into the system and introduce some business sense in the HW arena.

Strategy:

- **Inform private companies of the business opportunities in solid waste management**
  Business is not aware of the potential that awaits it in this sector, which is currently clouded by none funding of the programmes. Once funding start flowing in that direction, private players will be attracted. Government must support and promote this side of things.

- **Develop sustainable financing mechanism for HCWM activities**
  Innovative means of developing sustainable financing mechanism for the sector must be sought including attracting the banking sector and NGOs.

- **Set up framework and partnership between public sector and private sector in HCWM**
  Such a partnership will be beneficial to the sector as financing will become more available and the private sector will have the assurance of the support of the public sector in its endeavors.

**OBJECTIVE 6 : DEVELOP AND OPERATIONALISE SPECIFIC FINANCIAL RESOURCES TO COVER THE COSTS OF THE MANAGEMENT OF HEALTH-CARE WASTES**

**For sustainability it is absolutely necessary to develop and operationalise specific financial resources to cover the cost of HCWM. This really means having specific budget lines for health care issues from national to local level as a mandatory requirement.**

**In addition to this the execution of the plan then needs regular and sustained monitoring and evaluation. This will be done by establishing a reporting structure that has to be adhered to.**

**Strategy :**

- **Developing specific budget lines for HCWM at all levels of the accountancy (from national to local).**
  Lobby for mandatory budgeting for HCWM

- **Mobilising financial resources for HCWM capital and running costs.**
  Resources can be mobilized nationally by using such instruments as the polluter pays and the user pays principles

- **Identifying the appropriate institutions through which the recovery mechanism can be implemented.**
  If business sense is brought into the field of HCWM and acceptable segregation practices are adhered to, appropriate institutions can be attracted to engage in recovery programmes.

- **Monthly operational control reports**
  Regular reporting has to be institutionalized and formalized in all Health Care Institutions. This will assist in the regular monitoring and evaluation of the execution of the programme.

- **Mid-term evaluation (end yr 2)**
  Regular evaluation will assist in the regular monitoring and assessment of the execution of the programme..

- **Final Evaluation (end yr 5)**
  Regular evaluation will assist in the regular monitoring and assessment of the execution of the programme.

## 6.1 Logical framework of the HCWMP

**Table 6** HCWMP Logical Framework - LEGAL

| **OBJECTIVE 1 : TO REINFORCE THE NATIONAL LEGAL FRAMEWORK FOR HCWM.** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Result 1: Enabling legal environment for HCWM available.** | | | | | | | | | | |
| Strategies | • Developing a national policy for HCWM | | | | | | | | | |
| | • Creating, consolidating, reviewing and updating laws, bylaws and regulations related to HCWM | | | | | | | | | |
| | • Finalise the development of technical guidelines for HCWM | | | | | | | | | |
| | • Establishing control procedures for HCW management within all institutions generating and handling HCW | | | | | | Procedures in place | | | |
| | | | | | | | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | **UNIT** | **QNTY** | **UNIT COST USD** | **TOTAL COST USD** |
| Analyse all existing laws, bylaws and regulations | -Number of review meetings held<br>-Number of HCW legal documents analysed | Working group | X | X | X | X | | | | | 122 200.00 |
| Develop a national policy for HCWM | -Number of stakeholder consultative meetings<br>-Availability of a national HCWM policy | Steering committee | X | X | X | | | | | | 188 000.00 |
| Develop regulations and bylaws clearly highlighting the different responsibilities at all levels | -Availability of gazetted regulations and bylaws | Director Environmental Health | X | X | X | | | | | | 94 000.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| relating to HCWM | | | | | | | | | | | |
| Establishing procedures and roles for controlling the flow/s of HCW and increasing the responsibilities of all stakeholders | -Standard Operating Procedures which define roles and responsibilities in place | Director Environmental Health | X | X | X | | | | | | 122 000.00 |
| Finalise the National Healthcare waste Management guidelines. | Final draft for the National guidelines. | Working group | X | X | | | | | | | 65 800.00 |
| **SUB - TOTAL** | | | | | | | | | | | **592 000.00** |

**Table 7** HCWMP Logical Framework - INSTITUTIONAL ARRANGEMENTS

| **OBJECTIVE 2 : TO IMPROVE THE INSTITUTIONAL FRAMEWORK FOR HCWM** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Result 2: Responsibilities, standards, and sanctions are clearly defined** | | | | | | | | | | | |
| Strategies | • Defining and harmonising the duties and responsibilities of each actor involved in HCWM process at all levels | | | | | | | | | | |
| | • Establishing of Taskforces/Working Groups (coordination structures) on health care waste management at National level | | | | | | | | | | |
| | • Facilitating the establishment of inter-sectoral taskforces/working groups and focal points at all operational levels | | | | | | | | | | |
| | • Creating awareness and lobbying for support for the HCWM program | | | | | | | | | | |
| | • Conducting operational research and development related to HCWM | | | | | | | | | | |
| | • Developing of Monitoring and Evaluation plan | | | | | | | | | | |
| | | | | | | | | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | **UNIT** | **QNTY** | **UNIT COST USD** | **TOTAL COST USD** |
| Organise a national workshop and give | -National workshop held | Director Environmental | X | | | | | | | | 9 500.00 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| feedback on findings of the Rapid Assessment Survey and expected roles and responsibilities of different players | - Workshop report produced | Health | | | | | | | | | |
| Cascade sensitization and formation of taskforces at operational levels | -Number workshops held<br>-Number of taskforce committees formed | Director Environmental Health | X | X | | | | | | | 7 600.00 |
| Facilitating conduction of at least one operational research per year on HCWM | -Number of research proposals submitted and funded<br>-Number of researches conducted | All Focal Persons | X | X | X | X | X | | | | 87 400.00 |
| Development of Monitoring and Evaluation tools for HCWM including establishment of a surveillance programme on accidents related to HCWM | -Availability of a surveillance system and baseline database on HCWM<br>-Availability of M&E checklists | Working groups | X | X | X | | | | | | 17 800.00 |
| Ensure on going and final evaluation and updating of the HCWMP as necessary. | -Updated HCWMP<br>- M & E biannual reports | Director Environmental Health | X | X | X | X | X | | | | 24 700.00 |
| **SUB-TOTAL** | | | | | | | | | | | **147 000.00** |

**Table 8** HCWMP Logical Framework - SITUATION ANALYSIS AND IMPROVEMENT

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OBJECTIVE 3 :** | **TO ASSESS THE HCWM SITUATION, PROPOSE OPTIONS FOR HEALTH CARE FACILITIES AND IMPROVE THE HCWM IN HEALTH CARE FACILITIES.** | | | | | | | | | | |
| **Result 3:** | **Appropriate options available for the different categories of Health care facilities and HCW collected and treated in a safe and secure way** | | | | | | | | | | |
| Strategies | • Carrying out a National Inventory of Health Care Facilities {HCFs} to help establish the HCWM situation in the country. | | | | | | | | | | |
| | • Choosing the best technical options for HCW segregation, collection, containment, storage, transportation and disposal according to (a) type of HCW (b) the size and location of the HCF. | | | | | | | | | | |
| | • Implementing pilot projects before setting up the HCWMP. | | | | | | | | | | |
| | • Providing infrastructure, materials and equipment to HCFs based on conditions on site. | | | | | | Number of equipment | | | | |
| | • Ensure appropriate protection equipment to health staff | | | | | | Number of equipment | | | | |
| | | | | | | | | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | **UNIT** | **QNTY** | **UNIT COST USD** | **TOTAL COST USD** |
| Conduct a National Inventory of HCWM in Health Care Facilities (HCFs.) | Inventory document | Director DEH | X | | | | | | | | 251 000.00 |
| Analyze the inventory data and develop options | Report | Working group | X | | | | | | | | 47 020.70 |
| Establish National Standard Procedures for the deferent options selected defining the processes of segregation, packaging, collection, | National standard procedures in place. | Working group | X | X | | | | | | | 12 547.30 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| containment, transportation, treatment and final disposal accordingly, including the provision of adequate sanitation and proper disposal of wastewater. | | | | | | | | | | | |
| Select and size the HCW treatment facilities accordingly including site visits to pilot projects in RSA and Botswana. | Treatment facilities selected | Working group | X | X | X | X | | | | | 96 225.00 |
| Provide the health care facilities with adequate infrastructure and equipment for HCWM. | Infrastructure and equipment availed | Steering committee | X | X | X | X | X | | | | 3 694 207.00 |
| **SUB-TOTAL** | | | | | | | | | | | **4 100 000.00** |

**Table 9** HCWMP Logical Framework - TRAINING AND GENERAL PUBLIC AWARENESS.

| **OBJECTIVE 4 : TO CONDUCT AWARENESS CAMPAIGNS FOR THE COMMUNITIES AND PROVIDE TRAINING FOR ALL ACTORS INVOLVED IN HCWM** | | |
|---|---|---|
| **Result 4: All HCWM actors are conscious of risks and demonstrate good HCWM practices** | | |
| Strategies | • Inform population of dangers linked with bad HCW management practices | Posters, radio and televised messages, public animations sessions, etc. |
| | • Inform population of dangers linked to scavenged HCW materials | |
| | • Inform home-based care givers / traditional healers of risks linked to improper HCW handling | |
| | • Conducting awareness campaigns on proper handling of HCW | |
| | • Elaborate training programs and Train trainers | Programs elaborated and Number of trained trainers |
| | • Organising training programmes for all actors involved in HCWM with special emphasis on medical and non medical staff | % of trained staff |

| | • Evaluate training program implementation | | | | | | | Appraisal reports | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | **UNIT** | **QNTY** | **UNIT COST USD** | **TOTAL COST USD** |
| Develop specific HCWM Information Education and Communication (IEC) materials | -Availability of specific IEC materials | Working group | X | X | X | X | X | | | | 375 607.00 |
| Initiate a national awareness campaign through various media e.g. posters, print media, electronic media, and group discussions. | -Number of awareness campaigns held | Working group | X | X | X | X | X | | | | 336 398.00 |
| Conduct a training needs analysis for actors involved in HCWM. | -Number of training needs identified<br>-Training program developed | Working group | X | X | X | X | X | | | | 135 128.00 |
| Lobby to include HCWM in the training curricula for health personnel | -Number of meetings held<br>-Availability of reports | Head of Environmental Health | X | X | X | X | X | | | | 116 816.00 |
| Conduct on the job training of trainers (TOT) on HCWM and cascade training to operational levels | -Number of TOT sessions held<br>-Number of trainers trained<br>-Number of trainings cascaded | Working group | X | X | X | X | X | | | | 271 051.00 |
| **SUB-TOTAL** | | | | | | | | | | | **1 235 000.00** |

**Table 10** HCWMP Logical Framework - PRIVATE SECTOR PARTICIPATION

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OBJECTIVE 5 : TO SUPPORT PRIVATE INITIATIVES AND PARTNERSHIP IN HCWM** | | | | | | | | | | | |
| **Result 5. : Private players involved in HCWM** | | | | | | | | | | | |
| Strategies | Inform private companies of the business opportunities in solid waste management | | | | | | Awareness programs | | | | |
| | Develop sustainable financing mechanism for HCWM activities | | | | | | Annual financial flows | | | | |
| | Set up partnership framework between public sector and private sector in HCWM | | | | | | Number of Partnership agreements | | | | |
| | | | | | | | | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | **UNIT** | **QNTY** | **UNIT COST USD** | **TOTAL COST USD** |
| Organise a workshop for potential Private players and appraise them on the potential role they can play | -National workshop held<br>- Workshop report produced | Director Environmental Health | X | | | | | | | | 80 223.00 |
| Establish Private – Public sector partnership forum. | -Number consultations made.<br><br>-Number of taskforce committees formed | Director Environmental Health | X | X | X | X | | | | | 80 222.00 |
| Establish financing mechanisms to attract business community to participate in HCWM. | -Banking sector involvement secured<br>-Donor community sensitized.<br>-Waste generators budgeting for its management. | Director Environmental Health | X | X | X | X | | | | | 20 055.00 |
| **SUB-TOTAL** | | | | | | | | | | | **180 500.00** |

**Table 11** HCWMP Logical Framework - FINANCIAL AND OPERATIONAL ISSUES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OBJECTIVE 6 :** | **TO DEVELOP AND OPERATIONALISE SPECIFIC FINANCIAL RESOURCES TO COVER THE COSTS OF THE MANAGEMENT OF HEALTH-CARE WASTES.** | | | | | | | | | | |
| **Result 6:** | **HCWM activities are budgeted for, monitored, evaluated and documented** | | | | | | | | | | |
| Strategies | • Developing specific budget lines for HCWM at all levels of the accountancy (from national to local). | | | | | | | | | | |
| | • Mobilising financial resources for HCWM capital and running costs. | | | | | | | | | | |
| | • Identifying the appropriate institutions through which the recovery mechanism can be implemented. | | | | | | | | | | |
| | • Monthly operational control reports | | | | | | Monthly reports | | | | |
| | • Mid-term evaluation (end yr 2) | | | | | | Evaluation report | | | | |
| | • Final Evaluation (end yr 5) | | | | | | Evaluation report | | | | |
| **Activities** | **Indicators** | **Responsible Person** | **Time frame** | | | | | **Cost $US** | | | |
| | | | **2010** | **2011** | **2012** | **2013** | **2014** | | | | |
| Lobby for the establishment of a specific budget line for HCWM | HCWM budget line item established | Steering Committee | | X | | | | | | | 22 600.00 |
| Mobilize resources utilizing instruments such as the 'Polluter Pays Principle' | Resources mobilised | Steering Committee | X | X | X | X | X | | | | 45 200.00 |
| Raising financial resources through User Fees charges for private HCW generators | Funds raised | Working group | X | X | X | X | X | | | | 45 200.00 |
| **SUB-TOTAL** | | | | | | | | | | | **113 000.00** |

## 6.2 Summary of Costs

**Table 12 Summary of costs**

| OBJECTIVE | TOTAL COST $US |
|---|---|
| 1. TO REINFORCE THE NATIONAL LEGAL FRAMEWORK FOR HCWM. | **592 000.00** |
| 2. TO IMPROVE THE INSTITUTIONAL FRAMEWORK FOR HCWM. | **147 000.00** |
| 3. TO ASSESS THE HCWM SITUATION, PROPOSE OPTIONS FOR HEALTH CARE FACILITIES AND IMPROVE THE HCWM IN HEALTH CARE FACILITIES. | **4 100 000.00** |
| 4. TO CONDUCT AWARENESS CAMPAIGNS FOR THE COMMUNITIES AND PROVIDE TRAINING FOR ALL ACTORS INVOLVED IN HCWM. | **1 235 000.00** |
| 5. TO SUPPORT PRIVATE INITIATIVES AND PARTNERSHIP IN HCWM | **180 500.00** |
| 6. TO DEVELOP AND OPERATIONALISE SPECIFIC FINANCIAL RESOURCES TO COVER THE COSTS OF THE MANAGEMENT OF HEALTH-CARE WASTES. | **113 000.00** |
| **GRAND TOTAL** | **6 367 500.00** |

## 7.0 BUDGET FOR THE HCWMP

### 7.1 Estimated Cost of Implementing the HCWMP

The estimated cost of implementing the HCWMP and initiating the process of proper handling, disposal and management of medical waste is **US $ 6 367 500.00** Of this amount, **US $ 2 267 500.00** is for institutional framework development, training, and coordination/monitoring activities, and **US $ 4 100 000.00** is for investments in equipment and supplies to upgrade HCWM at the health facility level. Table 13 below provides details per component of the HCWMP, and Table 14 provides estimated yearly costs of the HCWMP implementation.

**Table 13** Implementation costs of the HCWMP

| OBJECTIVES | STRATEGIES | UNIT | QUANTITY | UNIT COST USD | TOTAL USD |
|---|---|---|---|---|---|
| **Reinforce the National legal framework for HCWM.** | Development of HCW Policy, Regulations and finalization of technical guidelines and standard operational procedures | Man/day | 1200 | 400 | 480 000 |
| | Printing the documents for circulation | U | 8000 | 14 | 112 000 |
| | **Sub-total** | | | | **592 000** |
| | | | | | |
| **Improvement of institutional Arrangements** | Workshops | | | | 10 000 |
| | Taskforce business | | | | 7 000 |
| | Awareness and lobbying | | | | 65 000 |
| | Operational research | | | | 65 000 |
| | **Sub-total** | | | | **147 000** |
| | | | | | |
| **Improvement of HCWM in the health facilities** | Piloting the various technologies in the various categories | | | | 200 000 |
| | Supply the health services with adequate HCW collection equipment | | | | 220 000 |
| | Acquire modern incinerators for the Referral Hospital, three Regional Hospitals, four Health Centres, ten clinics, The Central Stores, and seven Local Authorities | U | 26 | 95 000 | 2 470 000 |
| | Build local material incinerators in health centers, clinics and Public Health Units. | U | 500 | 2 200 | 1 100 000 |
| | Build stabilized concrete lined pits in rural health centers, Clinics, Public Health Units and for home based care | U | 200 | 550 | 110 000 |
| | **Sub-total** | | | | **4 100 000** |
| | | | | | |
| **Training programs** | formulation of comprehensive training manuals relevant to the target groups | Man/day | 600 | 400 | 240 000 |
| | Printing the documents for circulation | U | 6000 | 14 | 84 000 |
| | Training of trainers | Man/day | 600 | 120 | 72 000 |

| OBJECTIVES | STRATEGIES | UNIT | QUANTITY | UNIT COST USD | TOTAL USD |
|---|---|---|---|---|---|
| | Training of medical staff | Man/day | 3 000 | 120 | 360 000 |
| | Training of supplies staff | Man/day | 3 000 | 100 | 300 000 |
| | **Sub-total** | | | | **1 056 000** |
| | | | | | |
| **Public awareness** | Televised messages | **U** | 30 | 900 | 27 000 |
| | Radio messages | **U** | 120 | 400 | 48 000 |
| | Posters in Health centers | **U** | 10 000 | 6 | 60 000 |
| | Public animation sessions | **U** | 110 | 400 | 44 000 |
| | **Sub-total** | | | | **179 000** |
| | | | | | |
| **Supporting Private Initiatives** | Advocacy and lobbying at different fora | Man/day | 1600 | 100 | 160 000 |
| | Public-Private partnership Forum business | | | | 20 500 |
| | **Sub-total** | | | | **180 500** |
| | | | | | |
| **Support for the execution of HCWM Plan** | Plan starting activities and institutionalizing HCWM | Man/day | 300 | 100 | 30 000 |
| | Establishing the User Pays and the Polluter Pays Systems | Man/day | 300 | 100 | 30 000 |
| | Monitoring at national and local level | Man/day | 250 | 200 | 50 000 |
| | Halfway evaluation | Man/day | 70 | 450 | 31 500 |
| | Final evaluation | Man/day | 70 | 450 | 31 500 |
| | **Sub-total** | | | | **113 000** |
| | | | | | |
| **TOTAL** | | | | | **6 367 500** |

**Table 14** Annual costs of the HCWMP implementation

| HCWM Plan Activities | YR 1 | YR 2 | YR 3 | YR 4 | YR 5 | TOTAL |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Reinforce the National legal framework for HCWM.** | 250 000 | 250 000 | 92 000 | | | **592 000** |
| **Improvement of institutional Arrangements** | 50 000 | 40 000 | 19 000 | 19 000 | 19 000 | **147 000** |
| **Improvement of HCWM in health facilities** | 2 000 000 | 525 000 | 525 000 | 525 000 | 525 000 | **4 100 000** |
| **Training for health staff and others actors active in HCWM** | 556 000 | 250 000 | 250 000 | | | **1 056 000** |
| **Public awareness (general public)** | 35 800 | 35 800 | 35 800 | 35 800 | 35 800 | **179 000** |
| **Supporting Private Initiatives** | 90 250 | 45 125 | 45 125 | | | **180 500** |
| **Support for the execution of HCWM Plan** | 25 000 | 20 000 | 25 000 | 18 000 | 25 000 | **113 000** |
| **TOTAL** | **3 007 050** | **1 165 925** | **991 925** | **597 800** | **604 800** | **6 367 500** |

## 7.2 MOH Contribution to the Implementation of the HCWMP

**Table 15** MOH Contribution to the Implementation of the HCWMP

| Source of contribution | Type of contribution | Committed or projected | Value of contributions US$ |
|---|---|---|---|
| MOH | Cash | Projected | 54 000.00 |
| | Labour | Projected | 15 000.00 |
| **TOTAL Organization contributions** | | | **69 000.00** |

## 7.3 Contributions from Other Sources/Partners

**Table 16** Contributions from Other Sources/Partners

| Source of contribution | Type of contribution | Committed or projected | Value of contributions US$ |
|---|---|---|---|
| | | | |
| WHO | | Projected | 15 000.00 |
| | | | |
| **TOTAL Organization contributions** | | | 15 000.00 |

## 7.4 Project Funding Summary

**Table 17** Project funding summary

| FUNDING SOURCE | YR 1 | YR 2 | YR 3 | YR 4 | YR 5 | TOTAL US$ |
|---|---|---|---|---|---|---|
| | | | | | | |
| Amount requested from World Bank | | | | | | 6 283 500.00 |
| ***MOH*** contribution | | | | | | 69 000.00 |
| *Contributions from Other Sources/Partners* | | | | | | 15 000.00 |
| | | | | | | |
| **TOTAL PROJECT COST** | | | | | | **6 367 500.00** |

Thus the MOH requires **US $ 6 283 500.00** external support to be able to implement the HCWMP effectively

## 8.0 HEALTH CARE WASTE MANAGEMENT PLAN IMPLEMENTATION MODALITIES

### 8.1 Institutional framework

The HCWMP falls directly under the responsibility of the Environmental Health Department of MOH. The Department will coordinate the implementation and apply a multi-stakeholder approach to embrace all the relevant players to include MTEC, Local Authorities, NGOs, and other private players.

### 8.2 Responsibilities

Part of improving HCWM involves clarifying who is responsible for what functions and identifying the fields of competencies of each institutional actor involved in this process. The following roles and responsibilities are suggested:

**At central level :**

The MOH is responsible for the national health policy and ensures the guardianship of the health facilities. The Department of Environmental Health will take the lead in coordinating implementation of the HCWMP because:

(i) it is part of its mission,
(ii) it has competent staff in this field,
(iii) it has decentralized services down to ***Tinkudla*** level and
(iv) has capacity to offers Health Education Service, public information and awareness raising.

The Environmental Health Department will be heavily involved the following HCWM activities:

a) Procurement of consumables (sharp containers, color coded bin liners)
b) Procurement of re-usable waste receptacles
c) Running maintenance of existing incinerators
d) Ensuring availability of land for new sites for installation of new waste treatment and disposal facilities
e) Organising /facilitating capacity building on HCWM amongst Health Care Workers
f) Providing human resources (waste handlers, incinerator attendants etc.)
g) Through the EH Department assigning two EHO's to coordinate HCWM activities at National level and four EHO's at regional levels
i) Also the running and maintenance of the current working incinerators

MOH has no direct budget for Healthcare waste management activities but to implement such a programme MOH has been spending around US$ 69 000.00 annually (Table 18).

**Table 18** MOH Annual Expenditure on HCWM

| No. | EXPENDITURE CATEGORY | TOTAL (US$) |
|---|---|---|
| 1. | Personnel/Labour | 15 000.00 |
| 2. | Equipment/materials | 8 000.00 |
| 3. | Training/seminar/workshops | 15 000.00 |
| 4. | Contracts | 15 000.00 |
| 5. | Other costs (Transport and allowances) | 5 000.00 |
| 6. | Incidentals | 2 000.00 |
| 7. | Admin (10%) | 6 000.00 |
| 8. | Contingency (5%) | 3 000.00 |
| | | |
| | **TOTAL** | 69 000.00 |

The Department of Environmental Health is the lead agent for this programme and its work plan is as outlined in table 20 where it will be guiding the whole process.

The MTEC through its agent SEA, will be responsible for approving and overall supervision of the implementation of the HCWMP. It has the overall responsibility of protecting the environment and thus ultimately the activities of the Environmental Health Department must conform to the requirements of the Environmental Management act. It will watch over the means the whole chain of HCW from generation to final disposal.

SEA is also responsible for developing norms and standards for soil, water and air protection, mainly as they relate to the use of landfill sites for HCW disposal. This function is very important as this assures an independent control and monitoring mechanism for the system to bring about safe handling of HCW throughout the system.

**At the Regional / Local Authority level:**
The **Regional and Local Authorities** will need to put in place arrangements to make sure that HCW are not mixed with general wastes in their public landfills. This is becoming a challenge, with the advent of home based care in urban areas and innovative ways of convincing the public to separate at source have to be found.

The **Regional and Local Authorities** must ensure, either by themselves or through partnerships, that facilities capable of handling all the HCW generated in their areas of jurisdiction are in place. They should be responsible for a centralized HCWM regime within there areas of jurisdiction. They should also give their opinion about the HCWMP activities proposed for health facilities in their jurisdiction, in case some may have negative impacts on the local population's health. Coordination of the HCWM activities will be exercised their respective Environmental Health Departments.

The **Regional and Local Authorities** should design their landfills according to the norms and standards defined by SEA, in order to avoid soil, water and air pollution in case of reception of HCW. To accomplish safe disposal of HCW, specific areas should be reserved for that

purpose. In addition, local governments should enact regulations to: refuse to receive mixed HCW with non infectious wastes at local landfills; forbid uncontrolled HCW disposal; and set up strong waste management controls in their landfills (materials for covering, restriction for non authorized public access, equipment protection, etc.).

**At the health facility level:**
The manager of each health facility shall be responsible for HCWM in his/her establishment. The manager must ensure that a HCWM plan is prepared and then institute all the requirements of the national policy, regulations and standard operating procedures. S/he must designate the officers/teams charged with HCW segregation, collection, transportation and treatment and be overally responsible.

### 8.3 Institutional arrangements for HCWM Component Implementation

Effective implementation of the HCWMP components requires that institutional arrangements and responsibilities be clearly defined. The following institutional arrangements are proposed:

**i) Improvement of institutional and legal framework**

The co-ordination structure should be set up by the Department of Environment Health (DEH). This department should take the lead in developing the HCW regulations and technical guidelines.

**ii) HCWM improvement at health facilities**

The improvement of HCWM at health facilities should be managed by the DEH and Health facility managers working together. For example, DEH should regulate the HCWM in health facilities, in line with own regulations and SEA requirements. MOH should supply the health facility managers with HCWM equipment and materials, but actual execution of HCWM improvement programs should be conducted by health facility managers and their staff. Health facility managers should promote use of recyclable materials and set up control procedures in HCW management, under the supervision of DEH.

**iii) Training**

Training activities should be led by the DEH of the MOH. This structure has competence in HCWM and could be supported by training institutions like the University, the Polytechnic, and other institution.

At Regional level, management of training activities should be assigned to the Regional Health Management team. The specific training activities will be done in the first two years of the programme. National Consultants will train key staff as trainers in health facilities and I other institutions like the Municipalities. The trained key staff should then train the other employees.

The DEH may not have the human resources to prepare and diffuse the training courses about HCWM. The DEH could prepare the TOR, and do the control and supervision at national level while Regional Health Management teams would assume the monitoring at local level. In other words:

- The DEH prepares the Terms of Reference for developing the training programs, and does the control and supervision at national level ;
- Health Training Institutes or National Consultants having acquired a large experience in HCWM will prepare the training courses;
- In each Region, a training of trainers workshop will be held and will be conducted by Training institutions or national consultants, under the supervision of Region health management teams. The latter must prepare periodic reports to be sent to the central level (DEH/MOH);
- In each health facility, the supervising staff trained in the Regional workshops will ensure the training of all medical staff, orderlies, cleaners, etc., under their supervision. The heads of the health establishments must supervise this work and prepare periodic evaluation reports.

**iv) Public Awareness**

The Health Education/Environmental Health Department of the MOH will lead the activities intended to increase the awareness of the general public about the risks associated with HCW. At local level, Regional Management Teams will do the supervision. These activities will cover the 5 years of the program, through Public animations, radio and television messages, posters, etc., and will be done as follows:

- The Health Education/Environmental Health Department of the MOH will elaborate the content of these messages, of posters and public animation;
- The televised messages will be diffused by the National Station;
- The radio messages will be diffused by the local radio stations, in English and local languages , under the supervision of Regional management teams
- Private companies (printing enterprises) will make posters to be used in the health centers;
- Public animation sessions will be led by NGOs acting in the health and the environmental field, under the supervision of Regional Management Teams.

**v) Strategy for private sector involvement and partnership**

The elaboration of measures to involve private companies more directly in HCWM will be coordinated by the MOH, in collaboration with other stakeholders.

**vi) Baseline Survey and Activity Planning**

National Consultants, supervised by regional management teams and DEH, will carry out a baseline survey at the beginning of the investment phase. During this task, the consultants will indicate the situation prevailing presently in the health facilities, elaborate evaluation criteria, and prepare the execution plan.

### vii) Monitoring of the HCWMP

At the local level, it is recommended that the regional management teams ensure regular program oversight and provide monthly monitoring reports, while the six-monthly follow up will be realized by DEH.

### viii) Evaluation of the HCWM Plan

It is recommended to assign this evaluation to international consultants (under the supervision of DEH), to ensure its neutrality. This evaluation must be done halfway through (at the end of the 2nd year) and at the end of the first phase of the program (year 5).

The following table shows the implementation responsibilities for the HCWMP.

**Table 19** Implementation Responsibilities by Component

| COMPONENTS AND ACTIVITIES | | EXECUTION | CONTROL AND SUPERVISION |
|---|---|---|---|
| **Improvement of HCWM institutional and legal framework** | Set up a structure for coordination and follow up the POA | DEH | MOH/MTEC |
| | Develop regulations for HCWM | Consultants | DEH/MOH |
| | Develop technical guidelines for HCWM | Consultants | DEH/MOH |
| **Improve HCWM in health facilities** | Regulate the HCW management in health facilities | DEH | DEH/MOH and SEA/METC |
| | Supply HF with HCWM equipments and materials | Health facilities | DEH/MOH |
| | Ensure appropriate protection equipment for health staff | Health facilities | DEH/MOH |
| | Promote use of recyclable materials | Health facilities | DEH/MOH |
| | Set up procedures of control in HCW management | Health facilities | DEH/MOH |
| **Training** | Elaborate training programs and train trainers | Consultants/training Institutes | DEH/MOH |
| | Train all health staff active in HCWM | Supervising staff/ Training Institutes | DEH/MOH |
| | Evaluate the training program implementation | Heads of Health centers Health Regions | DEH/MOH |
| **Public** | Televised messages | National Television | Health Education /DEH |

| COMPONENTS AND ACTIVITIES | | EXECUTION | CONTROL AND SUPERVISION |
|---|---|---|---|
| **awareness** | Messages radio | local Radios | Health Education /DEH |
| | Posters in health facilities | Printers societies | Health Education /DEH |
| | Public animation sessions | NGO and CBO | Health Education /DEH |
| **Support the private initiatives and partnership in HCWM** | Diffuse information about business opportunities in solid waste management | DEH | MOH |
| | Develop partnership arrangements between public sector and private sector for HCWM | DEH /Health Facilities Region and Local Authorities | MOH / Ministry of Local Government |
| **Support the execution of HCWM Plan** | Plan HCWM activities | National Consultants | DEH/MOH |
| | Monitor the execution (national and local level) | Health Region | DEH/MOH |
| | Evaluation of the HCWM POA (halfway and final) | International Consultants | DEH/MOH, SEA/MTEC and Local Authorities |

## 8.4 Implementation Timeframe

The following timetable shows the proposed implementation schedule of HCWM Plan over a five year period.

**Table 20** Implementation Timetable

| HCWM Plan Activities | YR 1 | YR 2 | YR 3 | YR 4 | YR 5 |
|---|---|---|---|---|---|
| | | | | | |
| Development of HCWM policy | ■ | | | | |
| Regulation of HCW management | ■ | | | | |
| Development of technical guidelines and standard operation procedures for HCWM | ■ | | | | |
| Institutional arrangements - Set up a structure for coordination and follow up of the POA | ■ | ■ | | | |
| Improvement of HCWM in health facilities | | ■ | ■ | ■ | ■ |
| Elaboration of training programs and training of trainers | ■ | | | | |
| Training for health staff active in HCWM | ■ | ■ | ■ | | |
| Public awareness (general public) | ■ | ■ | ■ | ■ | ■ |
| Supporting private initiatives and partnership in HCWM | | | ■ | ■ | ■ |
| Monitoring and evaluation of the HCWM plan | ■ | ■ | ■ | ■ | ■ |

Before such an elaborate plan is implemented, certain activities can be started immediately, and others may be realized over the medium/long term.

**The following actions could be realized immediately**:

- set up a structure for coordination and follow up of the POA
- elaboration and dissemination of Policy, regulations, technical basic guidelines and standard operational procedures in HCWM
- elaboration of HCWM training program
- elaboration of public awareness training modules and supports
- set up HCWM procedures in health facilities, including health staff responsibilities

**In the short term:**

- training of trainers
- training all the stakeholders involved in the HCWM
- diffusing of public awareness programmes
- assessment of training program implementation
- halfway appraisal

**In the medium/longer term:**

- improvement of the HCWM in the health facilities
- Supporting of the private initiatives and partnership in HCWM
- Monitoring and evaluation of the HCWM plan

## 8.5 Potential Partners and field of intervention

Delivery of essential health services and the fight against HIV/AIDS relies on the involvement of a wide range of actors -- public and private sectors, NGOs, and civil society. So it is necessary to establish a partnership framework to identify the roles and responsibilities of each category of actor.

**Table 21** Potential field of intervention

| ACTORS | POTENTIAL FIELD OF INTERVENTION |
|---|---|
| Technical services of the State (MOH / MTEC) | - inform the local and national authorities<br>- facilitate co-ordination of HCWM plan activities<br>- supply technical expertise<br>- execute control and monitoring activities<br>- train the health staff<br>- supervise the training process, monitoring and evaluation |
| Local Authorities / Regions | - participate in the mobilization of populations<br>- ensure HCW are properly disposed in their landfill<br>- participate in training, monitoring and evaluation |
| Public health facilities / Private health facilities | - participate in training activities<br>- supply staff with security equipment<br>- elaborate internal plans and guidelines about HCWM<br>- allocate financial resources for HCWM<br>- ensure HCW management plan is implemented |
| Private operators | - invest in HCWM (e.g., treatment, transport, disposal) |

| ACTORS | POTENTIAL FIELD OF INTERVENTION |
|---|---|
| | - operate as sub-contractors (Local Authorities / Regions / Health Facilities) |
| NGOs and CBOs | - inform, educate and make population aware<br>- participate in / offer training activities |
| Training Institution | - provide health staff training |

## 8.6 Involvement of private companies in HCWM

HCW collection is a major concern for public and private health facilities. According to environmental regulations, health facilities must ensure sustainable management of their wastes. However, in practice health facilities have very limited financial resources, and no public health establishment has funds to pay for collection or disposal services for wastes. For health facilities having incinerators, waste collection is less of a concern. For private facilities, the major constraints are the absence of alternative solutions to their present practices: HCW co-mingled with general wastes and crude disposal. Most of them can't afford appropriate equipment for treatment.

Both public and private facility managers and staff express a willingness to participate in an institutional arrangement whereby costs of treating their HCW could be shared under a common agreement. Such a public-private partnership arrangement could be put in place on the basis of the following principles:

- selected public health facilities would be equipped with incinerators to serve a defined geographic radius;
- health centers equipped with incinerators would agree to accept and treat HCW from private facilities and smaller health centers within their service area;
- private health facilities receiving such HCW treatment services would agree to pay a collection / treatment fee as per the terms of the cost sharing agreement.

Long-term private sector involvement in the HCWM business will depend on whether national, Region, and municipal governments are able to put in place self-sustaining sources of financing to cover investment and operating costs for this critical environmental and public health service. If the financial equation is solved, then private sector operators can be expected to identify their individual comparative advantage and explore contractual arrangements to provide a range of services for health facilities and landfill sites (e.g., transport, treatment, and disposal).

## 9.0 THE HEALTH CARE WASTE STREAM

The management of waste must be **consistent** from the point of generation ("cradle") to the point of final disposal ("grave"). The path between these two points can be segmented schematically into eight steps.

**Step 1: waste minimization**

This first step comes prior to the production of waste and aims at reducing as much as possible the amount of HCW that will be produced by setting up an efficient purchasing policy and having a good stock management, for example.

**Step 2: HCW generation**

This is the point at which waste is produced.

**Step 3: segregation and containerization**

The correct segregation of waste at the point of generation relies on a clear identification of the different categories of waste and the separate disposal of the waste in accordance with the categorization chosen.

**Segregation must be done at the point of generation** of the waste. To encourage segregation at source, (reusable) containers or baskets with liners of the correct size and thickness are placed as close to the point of generation as possible. They should be properly **colour-coded** (yellow or red for infectious waste) and have the international infectious waste symbol clearly marked.

When they are 3/4 full, the liners are closed with plastic cable ties or string and placed into larger containers or liners at the intermediate storage areas. Suitable latex gloves must always be used when handling infectious waste.

**Step 4: intermediate storage (in the HCF)**

In order to avoid both the accumulation and decomposition of the waste, it must be collected on a **regular** daily basis.

This area, where the larger containers are kept before removal to the central storage area, should both be close to the wards and not accessible to unauthorized people such as patients and visitors.

**Step 5: internal transport (in the HCF)**

Transport to the central storage area is usually performed using a wheelie bin or trolley. Wheelie bins or trolley should be easy to load and unload, have no sharp edges that could damage waste bags or containers and be easy to clean. Ideally, they should be marked with the corresponding coding color.

The transport of general waste must be carried out separately from the collection of healthcare risk waste (HCRW) to avoid potential cross contamination or mixing of these two main categories of waste. The collection should follow specific routes through the HCF to reduce the passage of loaded carts through wards and other clean areas.
Step 6: centralized storage (in the HCF)

The central storage area should be sized according to the volume of waste generated as well as the frequency of collection. The facility should not be situated near to food stores or food preparation areas and its access should always be limited to authorized personnel. It should also be easy to clean, have good lighting and ventilation, and be designed to prevent rodents, insects or birds from entering. It should also be clearly separated from the central storage area used for HCGW in order to avoid cross-contamination. Storage time should not exceed 24-48 hours especially in countries that have a warm and humid climate.

**Step 7: external transport**
External transport should be done using dedicated vehicles. They shall be free of sharp edges, easy to load and unload by hand, easy to clean / disinfect, and fully enclosed to prevent any spillage in the hospital premises or on the road during transportation.

The transportation should always be properly documented and all vehicles should carry a consignment note from the point of collection to the treatment facility.

**Step 8: treatment and final disposal**
There are a number of different treatment options to deal with infectious waste. These are detailed under the "Determination of Treatment Systems and Technologies" chapter.

## 10.0 DETERMINATION OF TREATMENT SYSTEMS AND TECHNOLOGIES

The relative risk approach will be used in determining the treatment system and technology to be used at each HCF. The criteria used for deciding on the system is that it protects in the best way possible, healthcare workers and the community as well as minimize adverse impacts on the environment.

Environmental-friendly and highly technical equipment often used for treating health care waste may not always be affordable or possible to operate at some of the rural health care facilities in Swaziland due to lack of electricity supply and non availability of requisite skills. Appropriate technologies should, therefore, be considered in such instances in order to avoid health risks from exposure to mismanaged health care waste. The use of a burial pits or a small-scale incinerator, although clearly not the best solution, is preferred over uncontrolled dumping. Disposal technologies are therefore recommended on the basis of the level of health safety they provide which eliminates risks as much as possible. The HCWM systems can subsequently be upgraded to reach higher safety standards when conditions permit.

### 10.1 Solid Wastes Treatment

HCW treatment systems should be efficient, environmentally sound, and permit access controls, so as to protect persons from accidental exposure to waste during the treatment process. Technology choices should be made according to the following criteria:

- Performance and efficiency of treatment
- Environmental viability.
- Easiness and simplicity in setting up, operating and maintenance/care.
- The spare parts should be available and easy to get.
- Costs of investments and operating.
- Social acceptability

In addition to this, the waste treatment system should be close to the waste generating point. The following is an outline of available technologies for treating HCW:

**a. Microwave disinfection**

This method is used to disinfect bio-medical waste in stationary or mobile plants. The waste is heated by means of microwave energy. This method needs high investment and operating costs.

**b. Autoclave sterilization**

This type of treatment is used in health facilities (medical analysis laboratories) for the sterilization of reusable medical equipment. In this process, a dry heat sterilizer is used and heat of 180° C is generated for 30 minutes or longer, for activating vegetative microorganisms and most bacterial spores. This process is able to handle

only limited quantities of waste and therefore is commonly used only for highly infectious waste such as microbial cultures from clinical or research laboratories. Autoclaving is environmentally sound, requires fairly high investment and moderate operating costs, and ensures good disinfection efficiency under appropriate operating conditions. However, it cannot be used for all type of waste and generates contaminated wastewater. In addition, operation requires qualified technicians and its shredders are subject to frequent breakdown.

**c. Incineration**

Waste incineration is a thermal treatment, which aims at destroying organic waste parts by oxidation. Various types of equipment are in use:

- Pyrolitic incinerator: This has a treatment capacity ranging from 500 to 3,000 kg wastes daily, at a combustion temperature of 1200° or 1600° C; its initial cost is very expensive. It also needs highly qualified staff. The remnants of wastes are sent to landfill disposal sites.
- Pyrolitic incinerator (modern incinerator): its treatment capacity is from 200 to 10,000 kg/daily, with a combustion temperature ranging from 800 to 900° C; its requirements in terms of investment and care taking are somewhat high; it needs qualified staff; the remnants of wastes are sent to the landfill disposal sites.
- Incinerator with combustion room (artisanal construction, with local materials): Its investment and care taking costs are relatively low; it can work effectively, even with low-qualification staff.

Incineration provides very high disinfection efficiency and drastic reduction of weight and volume of waste. It is relatively low in cost and does not need qualified staff for operating. But it generates significant pollutant emissions.

**d. Chemical disinfection**

Chemical disinfection, frequently used in health facilities to destroy microorganisms on medical equipment, floors and walls, is now being extended to the treatment of biomedical wastes. Chemicals are put in the waste to destroy or inactivate the pathogens. This treatment usually is more efficient as in disinfection than in sterilization. Chemical disinfection is most suitable for treating liquid waste such as blood, urine, stools or hospital sewage. Solid (and even highly hazardous) biomedical wastes, including microbiological cultures, sharps, etc., may also be disinfected chemically. Chemical products such as hypo-chlorine and other acids are used to destroy pathogens, before wastes are burned or transported to disposal sites. The most frequent chemical disinfectants are:

- Chlorine - which is a universal disinfectant, very active against micro-organisms. In case of possible HIV/AIDS infectious materials, concentration of 5 g/litre (5000ppm) of chlorine is recommended.

- Formaldehyde - which is an active gas against all micro-organisms except at low temperature (<20°C); the relative humidity must be near 7 %. It is also sold in the form of gas dissolved in water at concentrations of 370 g / litres. This disinfecting product is recommended for Hepatitis and Ebola virus (but not for HIV/AIDS). The risk associated with formaldehyde is that it can cause cancer.

The drawback of this system is that the disinfected waste will still require other additional disposal methods in order to eliminate completely. This method gives highly efficient disinfection in good operating conditions, and some chemical disinfectants are relatively inexpensive. But it requires highly qualified technicians for operating the process.

**e. Burial in municipal landfills**

This practice consists in disposing of HCW directly in municipal landfills. In fact, this is not a treatment system: the wastes are stored with household wastes. This system requires very low investments, but it presents huge health and environmental risks, in view of scavenging practices at public landfills. However, land filling is better than leaving hazardous wastes accumulated at hospitals or other publicly accessible places. More suitable treatment methods should immediately be envisaged.

**f. Burial inside health facilities**

Burial at the origin of HCW production – the health facility - is another form of elimination, mainly used where there is no treatment system or means of waste transportation to public landfills. The risk in this case is that the destruction of infected wastes is not sure, according to the burial place. Also, there is always the risk of digging out wastes, most of all, the sharp objects.

**g. Concrete Lined Pits**

Disposal at the origin of HCW production in concrete lined pits at the health facility - is another form of elimination, mainly used where there is no treatment system or means of waste transportation to public landfills. The risk in this case is reduced by the lining and the pit must be above the water table. However the destruction of infected wastes is not sure, according to the burial place. Also, there is always the risk of digging out wastes, most of all, the sharp objects. **(See ANNEX 6 for designs)**

**h. Open air burning**

When done in open air, the burning of HCW constitutes a factor of pollution and harm to the environment. Since HCW is generally burned in a hole, the destruction is never complete: often the quantity of unburned residue constitutes 70 % of the original wastes. This encourages children and scavengers to look for toys and reusable objects.

i. **Encapsulation**

This method consists of disposing of wastes by filling metal or plastic containers ¾ full with waste materials and topping the container up with plastic foam, bituminous sand, cement mortar or clay material. The process is cheap, safe and very appropriate for health centres that cannot envisage other methods to treat sharps, chemical and pharmaceutical waste. Encapsulation is not recommended for non-sharps infectious waste. The main advantage is to prevent the risk of scavengers getting access to these wastes in landfills and to reduce mobilization of toxic substances.

### *10.1.1 Comparative analysis of solid HCW treatment systems*

Table 22 demonstrates the advantages and drawbacks of each treatment system, along with its fitness in the economic and socio-cultural context of Swaziland.

**Table 22** Comparative analysis of solid HCW treatment systems

| System | Technical Feasibility | Investment Cost | Operating Cost | Easiness/simplicity | Availability of spare parts in Swaziland | Environmental Viability | General Social acceptance |
|---|---|---|---|---|---|---|---|
| Autoclave | Very efficient but cannot be used for all types of waste | Fairly high | Average | Very qualified staff | Not available locally | Ecological, but generates contaminated wastewater | Very good |
| Microwave irradiation | Very efficient | Very high | Very high | Very qualified staff | Not available locally | Very ecological | Very good |
| Pyrolyse | Very efficient | Very high | Average | Qualified staff | Possible | Very ecological | Very good |
| Pyrolitic incinerator (modern incinerator) | Very efficient | Fairly high | Average | Limited skills | Possible | Little pollution | Very good |
| Local material incinerator | Fairly efficient | Low | Low | Limited skills | Available | Polluting | Very good |
| Chemical disinfection | Fairly efficient | Low | Low | Qualified staff | Available | Polluting | Fairly good |
| Burial in municipal public landfills | Inefficient | Low | Low | Qualified staff | Available | Very polluting and risky | Bad |
| Burial inside health facilities | Inefficient | Low | Low | Limited skills | Available | Polluting and risky | Bad |
| Use of Concrete lined Pits | Efficient | Low | Low | Limited skill | Available | Non polluting | Fairly good |
| Incineration at open air | Inefficient | Low | Low | Limited skills | Available | Polluting and risky | Very bad |
| Encapsulation | Very efficient for sharps, drugs but not recommended for non-sharps | Low | Low | Limited skills | available | Non polluting | Good |

### *10.1.2 Recommendations for Solid Wastes Treatment*

The comparative analysis, based on the above mentioned economic and technical criteria, leads to the following recommendations:

- Modern incinerators in Referral hospitals, Mission hospitals, Regional hospitals' Health Centres, Some Clinics, The Central Stores, and the Local Authorities, because of its fairly low cost and operating skills requirements;
- Local incinerators (built with local material) in health centres, clinics and Public Health Units because of its very low cost and small quantities of HCW produced in these facilities;
- Stabilized concrete lined pits in rural health centers, Clinics, Public Health Units and for home based care, because of very low HCW production.

Inadequate incineration, or incineration of non- incinerable (halogenated plastic, radioactive waste, reactive chemical waste, silver salts or radiographic waste, mercury or cadmium, heavy metals, etc.) waste can release pollutants into the air. The incineration of materials containing chlorine can generate dioxins and furans, which are classified as possible human carcinogens and can have other adverse effects. Incineration of heavy metals or materials with high metal contents (in particular: lead, mercury and cadmium) can increase the spread of heavy metals in the environment. Dioxins, furans and metals are persistent and remain in the environment. Materials containing chlorine or metal should therefore not be incinerated.

To ensure that inappropriate materials are not incinerated, the waste incineration system must be based on a strategy of segregation at source, to reduce as much as possible the infectious waste stream and to prevent the contamination of other wastes (papers, plastic objects, etc.). All types of wastes must not be incinerated, mainly the non-incinerable ones mentioned above. Waste segregation will allow the non-contaminated, non-infectious and non-incinerable wastes to be disposed at municipal landfills. Only the contaminated wastes (needles, sharp objects, blood stained cottons, etc.) are reserved for incineration. The latter don't produce (or produce very little) toxic elements. In addition, this system of treatment allows a complete melting of needles, which are the main vectors of accidental transmission of HIV/AIDS.

Modern incinerators, with special emission-treating equipment, are able to work at 800-1000° C, and can ensure that no dioxins and furans, or only insignificant quantities are produced. Smaller models, built with local materials and able to operate at these high temperatures are currently being field-tested and implemented in some countries.

In the health centres, the quantities of HCW produced are insignificant. If waste segregation is performed well, the quantities to be incinerated will be reduced and negative impacts on the environment will be insignificant. In addition, promotion of the use of non-chlorine plastic containers can reduce polluting by-products in solid waste incineration.

Although incineration has its critics, it is difficult to choose another system for developing countries such as Swaziland, given the economic and technical conditions. The proposal is not to incinerate all solid urban waste (household wastes, industrial wastes, etc.), but only selected contaminated health care wastes. Appropriate incinerator technology is supported by the WHO elsewhere in Africa. For example, during vaccination campaigns against tuberculosis in Togo and Benin, the WHO has supported, since 2001, a program to produce craft incinerators (made of local materials, cement with clay), in order to destroy the syringe needles used in the vaccination program. WHO organized a workshop in Bamako in 2001 to train some African technicians in the building of these types of incinerators. These models can reach very high temperatures (800° C) able to get the needles and sharp objects melted (the model is shown in annex xx).

Presently, there are no environmentally sound options at low-cost for safe disposal of infectious wastes. Incineration of wastes has been widely practiced, but alternatives, which may be preferable under certain circumstances, are becoming available, such as autoclaving, chemical treatment and microwaving. Land filling, when safely practiced, may also be a viable solution for part of the already segregated wastes.

Autoclave, microwaves systems are surely more efficient and environmentally sound, but more difficult to operate, too; they are very expensive and require qualified staff for operating. They cannot be used for all types of waste and generate contaminated wastewater, and in case of malfunction, the spare parts are not available locally. So, these types of technologies should not be recommended in Swaziland, given the present economic situation. Chemical disinfection requires chemical products permanently and qualified staff for operating; the disinfected wastes must also be sent to landfill disposals or other systems of disposal after such treatment.

It is therefore important that where incineration is recommended, it should be accompanied by: (i) appropriate skills training of those who will operate the incinerators; (ii) appropriate and continuous monitoring of level of inflammability and type of waste incinerated.

Whenever incinerators become an increasingly difficult option to use, the following treatment systems should be proposed:

**Chemical disinfection:**
This method gives highly efficient disinfection, and some chemical disinfectants are not expensive. As for drawbacks, the method requires highly qualified technicians for operating and it is inadequate for pharmaceutical, chemical and some types of infectious waste. In central, general and provincial hospitals, which produce rather important quantities of HCW, the latter should be disinfected with chemical products, then evacuated to the public landfills where specific areas have been prepared before hand.

**Disposal at municipal landfills:**
In case hazardous health-care waste cannot be treated or disposed elsewhere, direct burying in the municipal landfill should be recommended. To prevent the important disease burden currently created by these wastes, it is necessary : to prepare specific areas for HCW disposal, to limit access to this place (wire fencing and lock) and to bury the waste quickly to avoid contact with people or animals. It is a temporary solution before more suitable treatment methods are found.

**Burying inside hospital premises:**
In health centres where the HCW production is small, a ditch should be dug. Its bottom and walls must be cemented (or stabilized) to avoid contamination of the water table and prevent the walls from collapsing. The HCW thrown in the ditch must be covered with sand. The same procedure is repeated every time a new quantity of HCW is disposed, until the hole is full; in such a case, another hole is dug nearby. The hole must be protected (fence/lock) to avoid access and accidents. The main drawback is that burial places are not always available inside the health centres.

In all cases, the principle of waste segregation at source of production must be seriously respected, to minimize the contamination of general wastes by the infectious ones.

### 7.1.3 Sharps and needle treatment

Probably the most frequent risk is created by sharps (needles, scalpel blades, blood vials, glassware, etc.) in contact with infectious germs. In health facilities, needles and sharps should be collected in non-reusable containers, such as puncture-proof "sharps boxes", specific cardboard, metal or plastic boxes, or in empty rigid plastic bottles (with a tight fitting lid), if financial resources are not available. One must not put sharp objects in any container to be recycled or returned to a store. Table 23 demonstrates the advantages and drawbacks of each treatment system for sharps, along with its suitability in the economic and socio-cultural context of Swaziland.

**Table 23** Comparative analysis of sharps treatment systems

| Technology | Technical feasibility | Investment Cost | Operating Cost | Easiness /Simplicity | Availability of spare parts in Swaziland | Environmental viability | Social acceptance |
|---|---|---|---|---|---|---|---|
| **Autoclave Microwave irradiation** | Very efficient | Very high | Average | Needs very qualified staff | Not available | Non polluting, but requires disposal of residue | Very good |
| **Melting in incinerator (or needle incinerator)** | Very efficient | Medium for modern incinerator) and low (for craft ones) | Low | Low skills staff | Possible | Non polluting | Good |
| **Chemical disinfecting** | Efficient | Low | Low | Qualified staff | --------- | Polluting and Requires disposal of residue | Fairly good |
| **Storage in specific containers then landfill burial** | Fairly efficient | Very low | Low | Low skills staff | ---------- | Non polluting but risks digging out sharps | Fairly good |
| **Burial in the site of health centre** | Inefficient | Very low | Very low | Low skills staff | ---------- | risks of digging out sharps | Bad |
| **Mechanical grinding** | Very efficient | High | Low | Low skills staff | Not available | Non polluting, but ground sharps must be disposed | Good |
| **Encapsulation** | Efficient | Low | Low | Low skills staff | ---------- | Safe and non polluting | Good |

The melting of sharps in incinerators is very efficient. Whenever incinerators become an increasingly difficult option to use, encapsulation (filling metallic or plastic containers up to ¾ with wastes then filling up with cement, bituminous sand, etc.), chemical disinfecting, storage in specific containers (then landfill burial), should be recommended because of the very low cost. Autoclaving is a very efficient system, but it is very expensive.

## 10.2 Liquid Wastes Treatment

For liquid wastes, there are many treatment systems among which: (i) physical and chemical treatment; (ii) intensive biological systems (activated mud system; biological disk; bacterial field, etc.); (iii) septic pits/tanks; (iv) disinfection; and (v) decanting and digesting basin. Table 24 demonstrates the advantages and drawbacks of each treatment system for liquid wastes, along with its suitability in the economic and socio-cultural context of Swaziland.

**Table 24** Comparative analysis of liquid waste treatment systems

| System of treatment | Technical Characteristics | Technical Efficiency | Investment and Operating Cost | Recommendation for Swaziland |
|---|---|---|---|---|
| **Decanting and digesting basin** | - Mud draining<br>- very weak area (buried) | Medium | Fairly high | Recommended in central and regional hospitals |
| **Septic pits** | - Mud draining<br>- very weak area (buried) | Medium | Very low | Recommended in health centres |
| **Activated mud system** | - sifting<br>- mud draining<br>- ventilation<br>- fairly important area | Very high | Very high | Not recommended (very expensive) |
| **Biological disk, bacterial field** | - sifting<br>- mud draining<br>- fairly important area | High | Very high | Not recommended (very expensive) |
| **Physic and chemical treatment** | - sifting<br>- chemical products<br>- fairly important area | Very High | Very high | Recommended for central or general hospitals only |
| **Chemical disinfection** | - use of chemical products only<br>- little area is necessary<br>- No investments in infrastructure | High | Medium | Recommended |

Disinfection is clearly the most efficient way to deal with liquid infectious wastes. That is why this option should be favoured among the other interventions, because the HCWM plan is focused especially on HIV/AIDS related waste management. Consequently, a combined system (disinfection then storage in septic pits) is recommended for the provincial hospitals, Region hospitals and health centres, which don't produce much liquid waste. For the central and general hospitals, a physic and chemical treatment, comprising a disinfection system, is recommended. The implementation of this option requires a feasibility study.

## 11.0 DETERMINATION OF DISPOSAL SITES

### 11.1 Choice of Landfill Sites

In big cities such as Mbabane and Manzini, incineration residues, which are considered as household waste, can be disposed in the public municipal landfill, if specific burial areas are prepared, mainly to receive sharp objects not melted during the process. These types of waste hurt scavengers and street children even though they are sterilized during incineration. At Region and local level, the remaining wastes after burning can be buried inside health centres, away from patient treatment areas.

### 11.2 Decision Tree Scenarios

Five scenarios have been developed to describe the context within which health care facilities operate and must find solutions for the safe management of their wastes. The scenarios mainly distinguish between the population density of the area, the proximity to modern waste treatment facilities, and whether facilities are located in **urban, peri-urban** or **rural** environments. Five decision trees corresponding to each scenario are presented to show treatment choices and disposal options:

- **Scenario 1 (Annex 5) :** Urban area with access to a modern waste treatment facility or located within reasonable distance of a larger health-care facility with treatment facility
- **Scenario 2 (Annex 6) :** Urban area without access to modern waste treatment facility
- **Scenario 3 (Annex 7) :** Peri-urban area
- **Scenario 4 (Annex 8):** Rural area without access to modern waste treatment or disposal facility
- **Scenario 5 (Annex 9) :** Rural area with access to modern waste treatment or located within reasonable distance of a larger health-care facility with treatment facility.

## 12.0 THE MONITORING PLAN

### 12.1 Principle and Objective

Waste management is a continual task demanding a permanent effort from each and every person at the health facility. During the upgrading phase, the process of HCWM must be investigated and recorded. Once the required level is reached, regular monitoring should ensure that the desired standard is maintained. The monitoring of HCWM is part of the overall quality management system. To measure the efficiency of the HCWMP, as far as the reduction of infections is concerned; activities should be monitored and evaluated, in collaboration with concerned institutions: MHSW, MTEC, Local Authority, NGOs, etc.

### 12.2 Methodology

The HCWMP will be executed over 5 years and implementation monitoring will be carried out as follows:

**Table 25** Implementation Plan for M&E

| OBJECTIVE | TIMING/PERIOD | RESPONSIBLE PARTY |
|---|---|---|
| Development of HCWM policy | | |
| Legal framework<br>• Development of HCWM policy<br>• Regulation of HCW management<br>• Development of technical guidelines<br>• Development of standard operational procedures | At the beginning of the program (first year) | DEH/MHSW |
| Institutional arrangements<br>• Setting up a structure for coordination and follow up of the POA<br>• Supporting private initiatives and partnership in HCWM | At the beginning of the program (first year) | DEH/MHSW |
| Planning activities | At the beginning of the program | DEH/MHSW |
| Implementation of health facility HCWM Plan | Yearly, according to the time-table established | DEH/MHSW |
| Control and follow up of the execution of HCWM Plan activities | Daily | Health facilities |
| | Monthly | Health Department in the Regions (MHSW) |
| | Yearly | DEH/MHSW |
| Training :<br>• Elaboration of training | - two first years | - DEH/MHSW, National Consultants, Training Institutes |

| OBJECTIVE | TIMING/PERIOD | RESPONSIBLE PARTY |
|---|---|---|
| programs and training of trainers<br>• Training for health staff active in HCWM | | |
| Awareness<br>• Public awareness (general public | - yearly | - DEH/MHSW and NGOs, CBOs |
| HCWM Plan Evaluation | Half-way (at the end of the 2nd year) | DEH/MHSW, with the support of international consultant |
| | At the end of the 5th year | DEH/MHSW, with the support of international consultant |
| Supervision | Six-monthly | DEH/MHSW; MTEC; Local Authority |

## 12.3 Measurable Indicators

Program level indicators are presented in Tables 6 to 11 of the Logical Framework for the HCWMP. At the facility level, the following framework and measurable indicators could be developed into a standard format to facilitate comparability and usefulness of the data:

- **HCW management structure:**
  Reduction of waste, increase in efficiency; standard of hygiene; awareness of staff and patients; statistical data on waste generation; financial resources; functioning of responsibilities; training and awareness creation activities; monitoring and recording activities;

- **HCW collection:**
  Sufficient and appropriate collection containers; efficiency of waste segregation; frequency of waste removal; environmentally friendly handling of waste; responsibilities;

- **HCW transportation and storage:**
  cleanliness and functioning of transport equipment; execution of recommended transport procedures; status of storage facilities; cleanliness; separate storage of hazardous items; emergency equipment; lock and safety measures; responsibilities;

- **HCW treatment:**
  Incinerator for infectious waste; proper functioning of incinerator; maintenance procedure; safety regulation for operation; safe disposal of ash; responsibilities; sewage system; functioning of septic tanks; maintenance procedure; wastewater treatment;

- **HCW disposal:**
  Proper operation of landfill site; proper operation of waste pit for infectious waste; transport of chemical and radioactive waste; responsibilities;

- **General cleanliness:**
  containers not overfull; no used sharps outside or protruding from sharps containers; no foul-smelling waste in facility or on premises; no litter in facility or on premises; no faeces on premises; waste pits not overfull.

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## ANNEX 1 INVENTORY OF INCINERATORS IN GOVERNMENT HEALTH CARE FACILITIES

| NO. | MODEL | LOCATION | QNTY | STATUS |
|---|---|---|---|---|
| 1. | LA 250 | Mbabane Government Hospital | 1 | Old, rusted, leaks smoke and fails to completely incinerate bones and needles. |
| 2. | LA 50 | Mankayane Government Hospital | 1 | Old, rusted, leaks smoke and fails to completely incinerate. |
| 3. | LA 450 | Hlatsikhulu Government Hospital | 1 | Old, burner and control panel old and need replacement, top cover panel leaks |
| 4. | LA 50 | Matsanjeni Health Centre | 1 | Old, rusted, leaks smoke and small. Does not completely incinerate. |
| 5. | LA 50 | Hlangano Health Centre | 1 | Old, rusted, leaks smoke and small capacity and fail to completely incinerate. |
| 6. | LA 50 | Sithobela Health Centre | 1 | Has a new 250LA double burner |
| 7. | LA 50 | Mkhuzweni Health Centre | 1 | Old, rusted, operating fairly well. |
| 8. | LA 50 | Ndzevane Community Clinic | 1 | Burner, chimney need replacement |
| 9. | LA 50 | Nsingweni Community Clinic | 1 | Burner needs replacement |
| 10. | LA 50 | Lubulini Community Clinic | 1 | Old, rusted, operating fairly well. |
| 11. | LA 50 | Mental Government Hospital | 1 | Gas operated and old. Needs replacement |
| 12. | LA 150 | Vuvulane Community Clinic | 1 | Old, rusted, needs replacement |
| 13. | LA 50 | Mpolontsheni Community Clinic | 1 | Old, rusted, leaks smoke and fails to completely incinerate bones and needles. |
| 14. | LA 50 | Hlane Community Clinic | 1 | Burner needs replacement |
| 15. | LA 50 | JCI Community Clinic | 1 | No diesel for operations and burner too old |
| 16. | LA 50 | Gilgal Community Clinic | 1 | Not functional, some parts were stolen |
| 17. | LA 50 | Lobamba Community Clinic | 1 | Not functional, some parts were stolen |
| 18. | LA 50 | Siphofaneni Community Clinic | 1 | Burner needs replacement |
| 19. | LA 50 | Lomahasha Community Clinic | 1 | Old, rusted, but operating fairly well. |
| 20. | LA 50 | Boli Community Clinic | 1 | Old, rusted, burner needs replacement. |
| 21. | LA 30 | New Thulwane Community Clinic | 1 | Gas operated, very small and not incinerating well |
| 22. | LA 50 | Pigg's Peak Government Hospital | 1 | Old, rusted, leaks smoke and fails to completely incinerate bones and needles. |
| 23 | LA 50 | Dvokolwako Health Centre | 1 | Old rusted. Small and needs replacement |

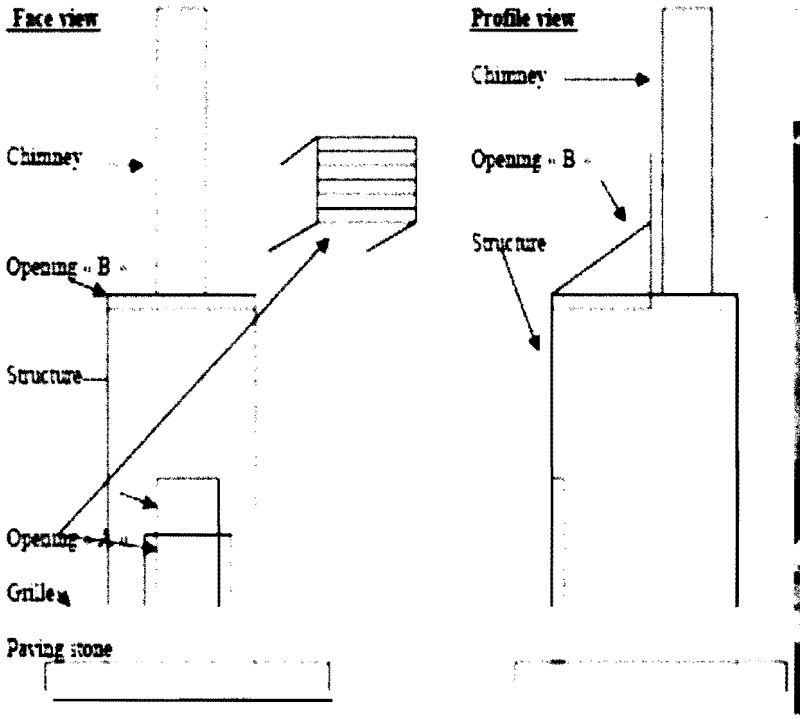
**ANNEX 2** MODEL OF "WHO" INCINERATOR MADE WITH LOCAL MATERIALS

**Some technical characteristics :**

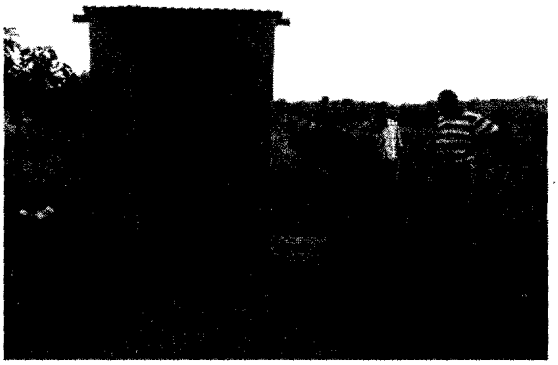
- Materials : red sand (laterite), clay, white cement
- Bricks of cooked sand
- Galvanized metal sheet Chimney

**Structure :**

- 0.6m x 1mx 1.5m
- Height of chimney : 5 to 6m
- Opening « A » for lighting and ashes recuperation : 40cmx30cm
- metallic gate (Galvanized metal sheet galvanized) for opening « A »
- metallic grate for burning the waste
- opening « B » for the introduction of waste: 40 cm x30cm
- mobile lid for shutting opening « B »
- Concrete paving stone (2m x 2m)

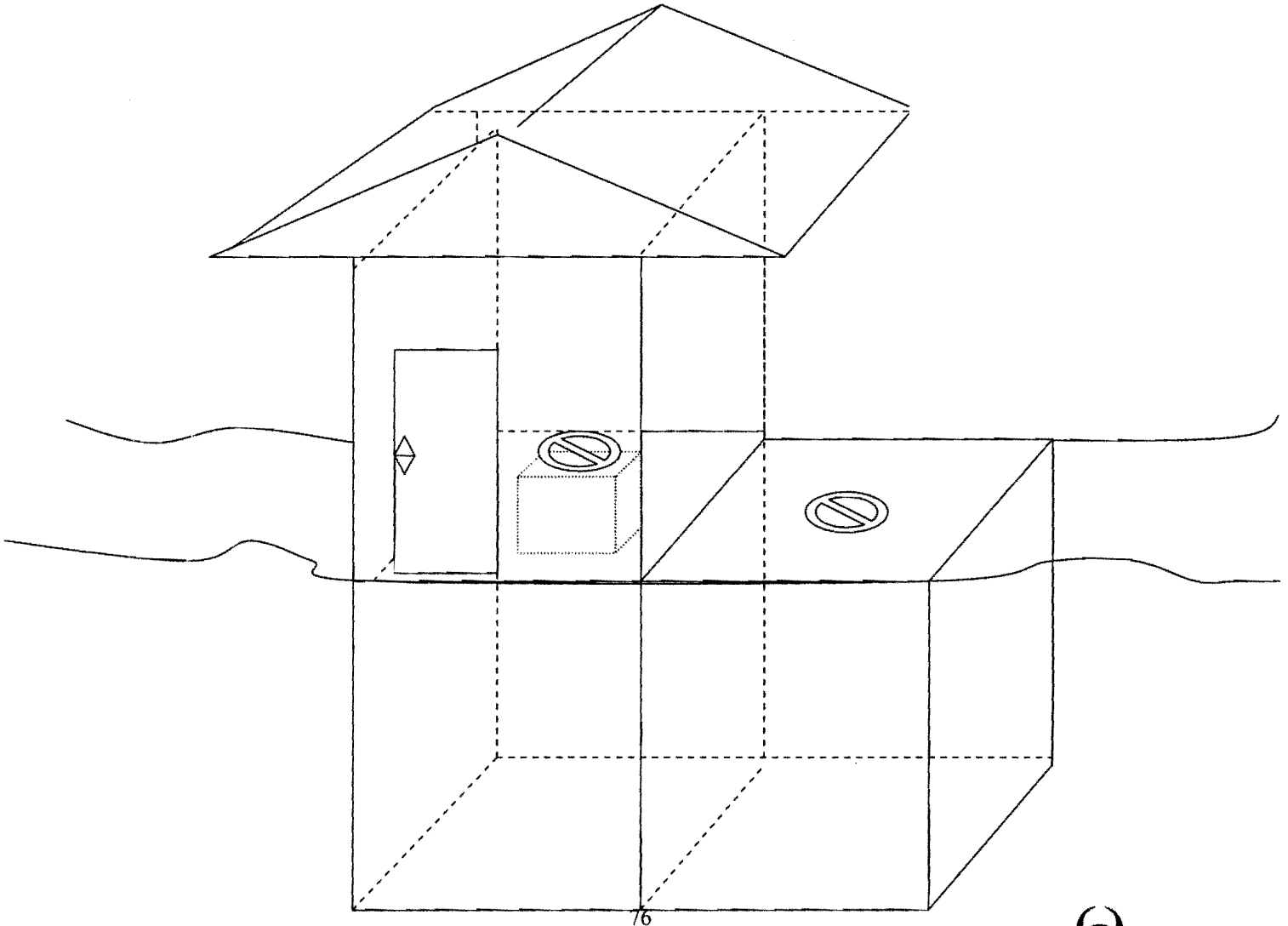


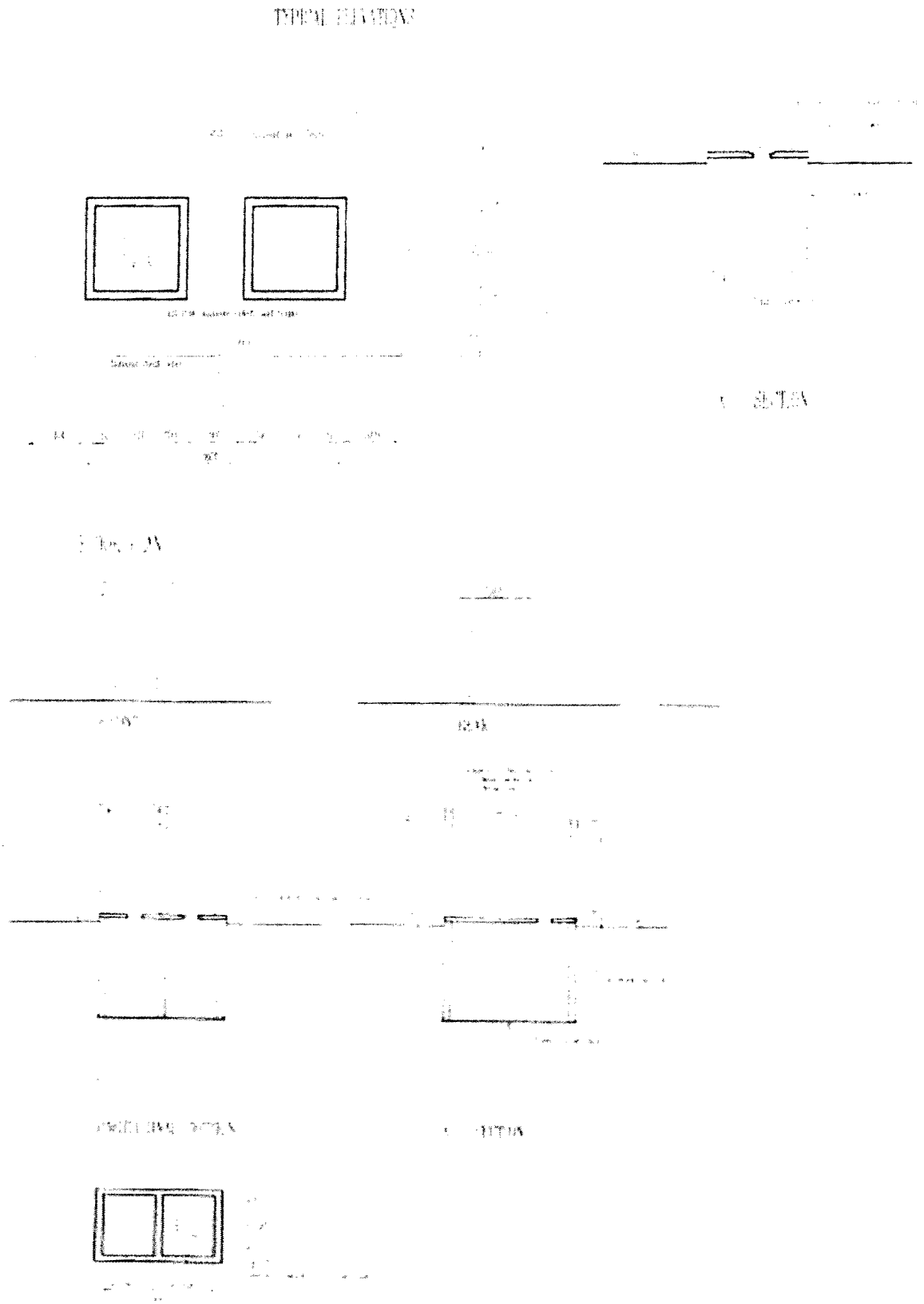
## ANNEX 3 CONCRETE LINED PIT - HOME BASED CARE WASTE DISPOSAL



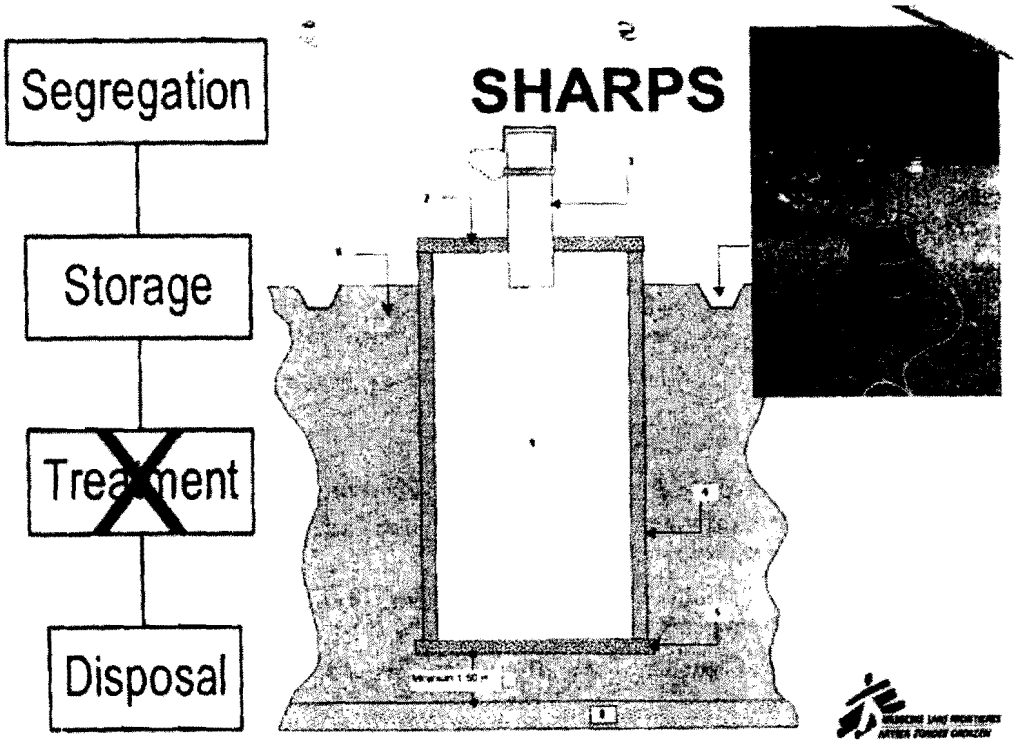
Pit with Pit Latrine for home based care

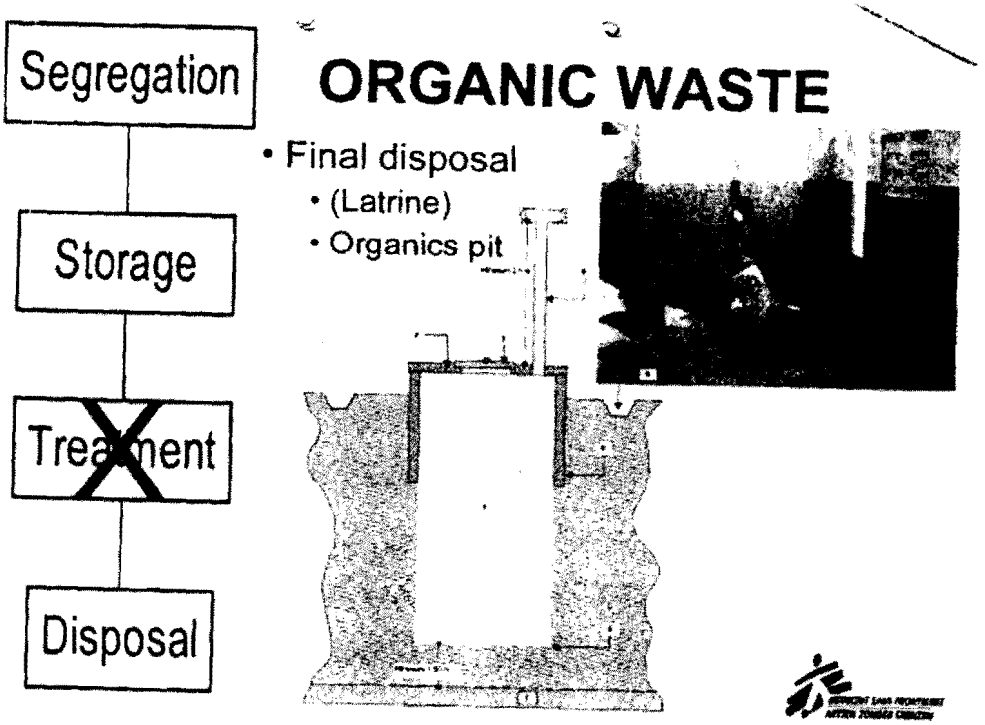
**Design:**





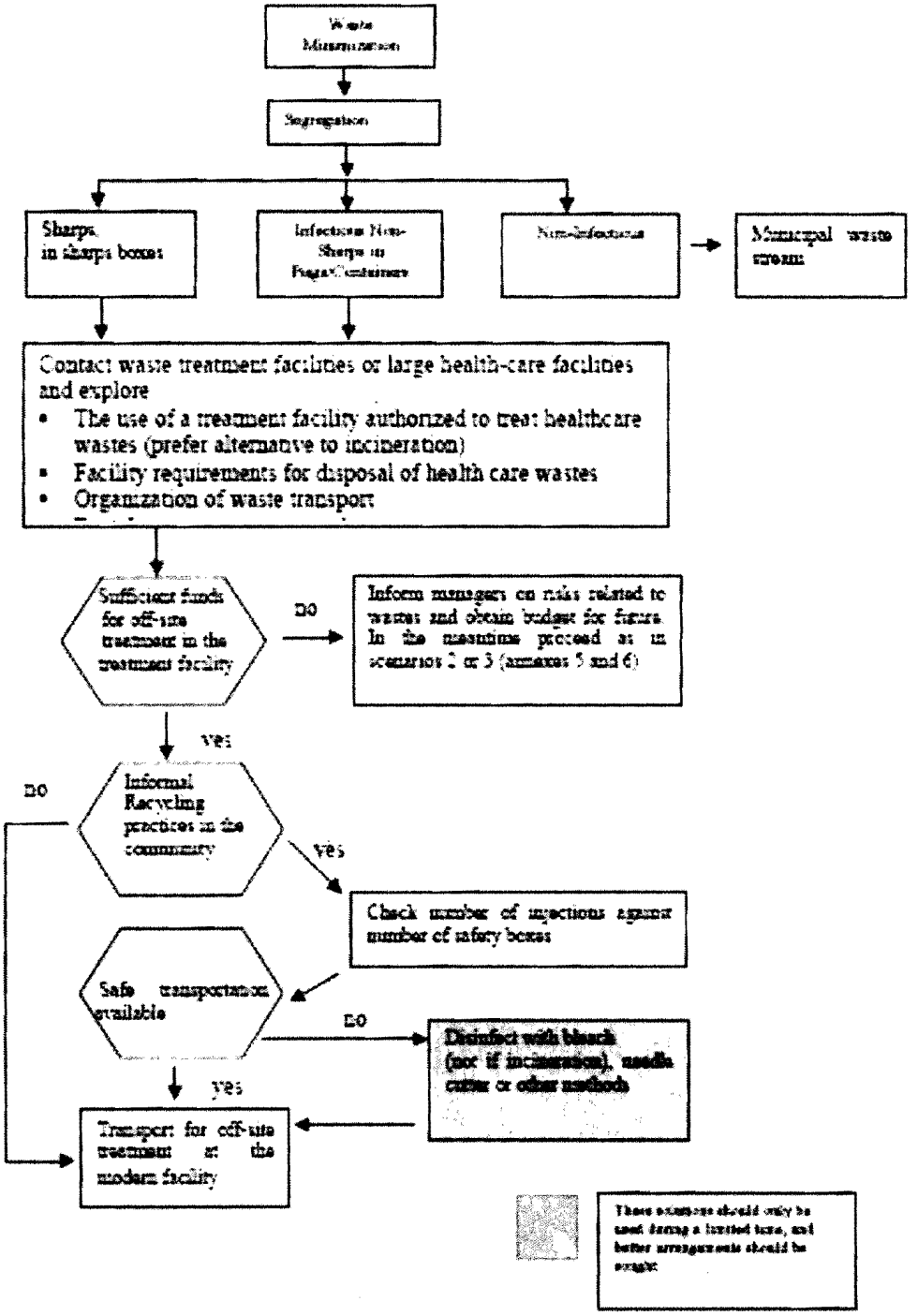
## ANNEX 4 CONCRETE LINED PIT - SHARPS AND INFECTIOUS DISPOSAL



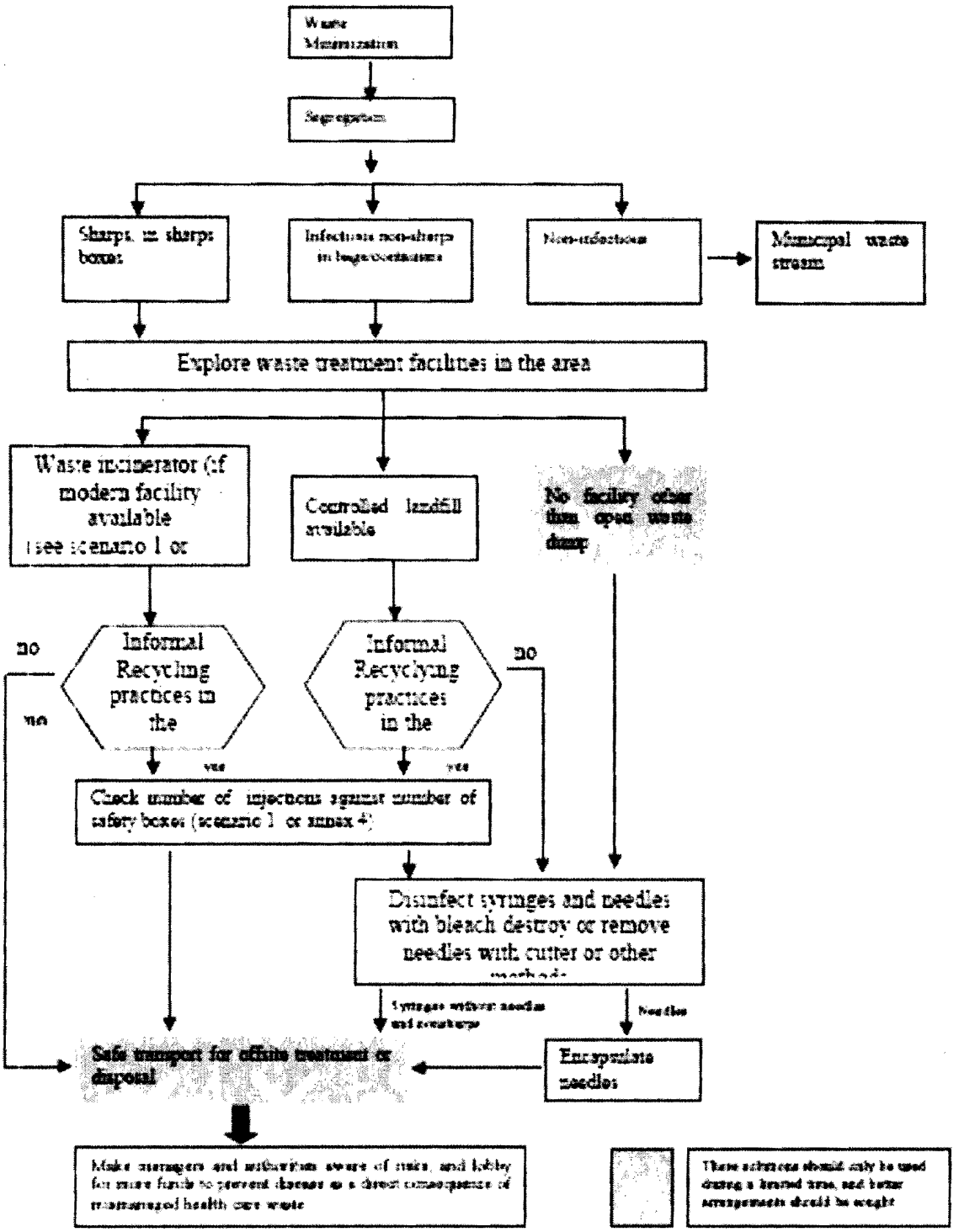
## ANNEX 5 HCW FACILITIES OPERATING SCENERIO 1

**Scenario 1:** Urban area with access to a modern waste treatment facility or located within reasonable distance of a larger health-care facility with treatment facility



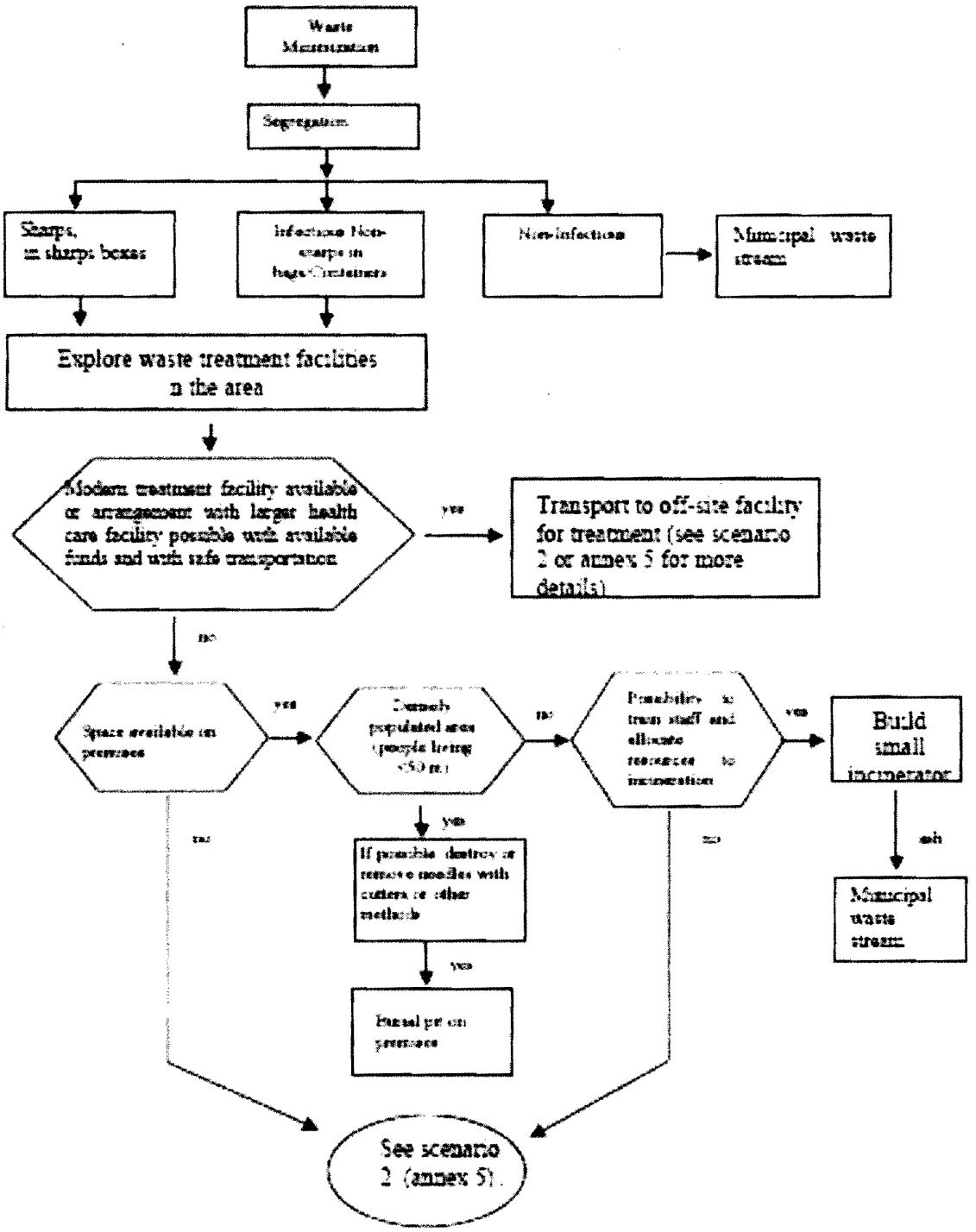
## ANNEX 6 HCW FACILITIES OPERATING SCENERIO 2

**Scenario 2:** Urban area without access to modern waste treatment facility



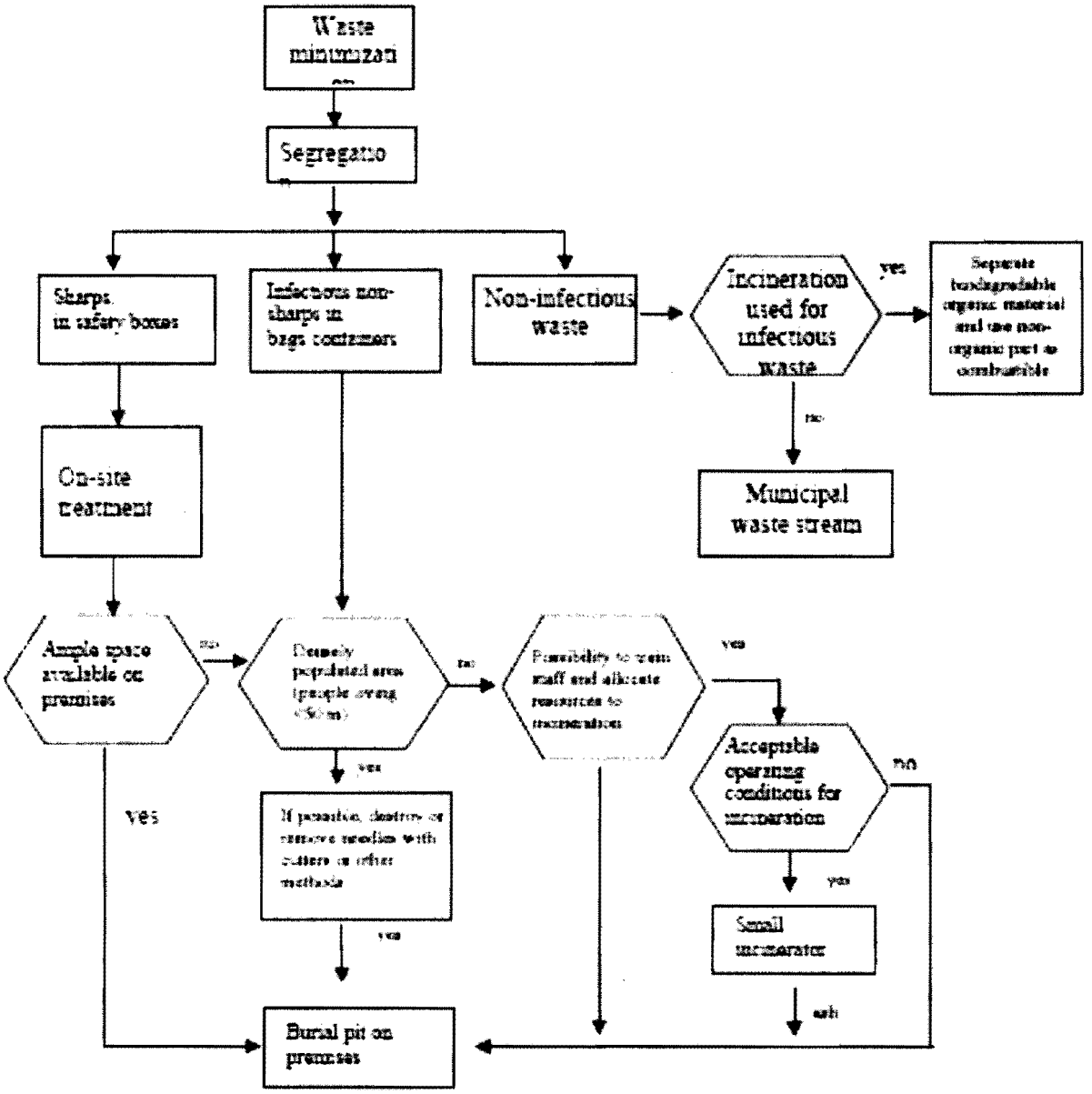
## ANNEX 7 HCW FACILITIES OPERATING SCENERIO 3

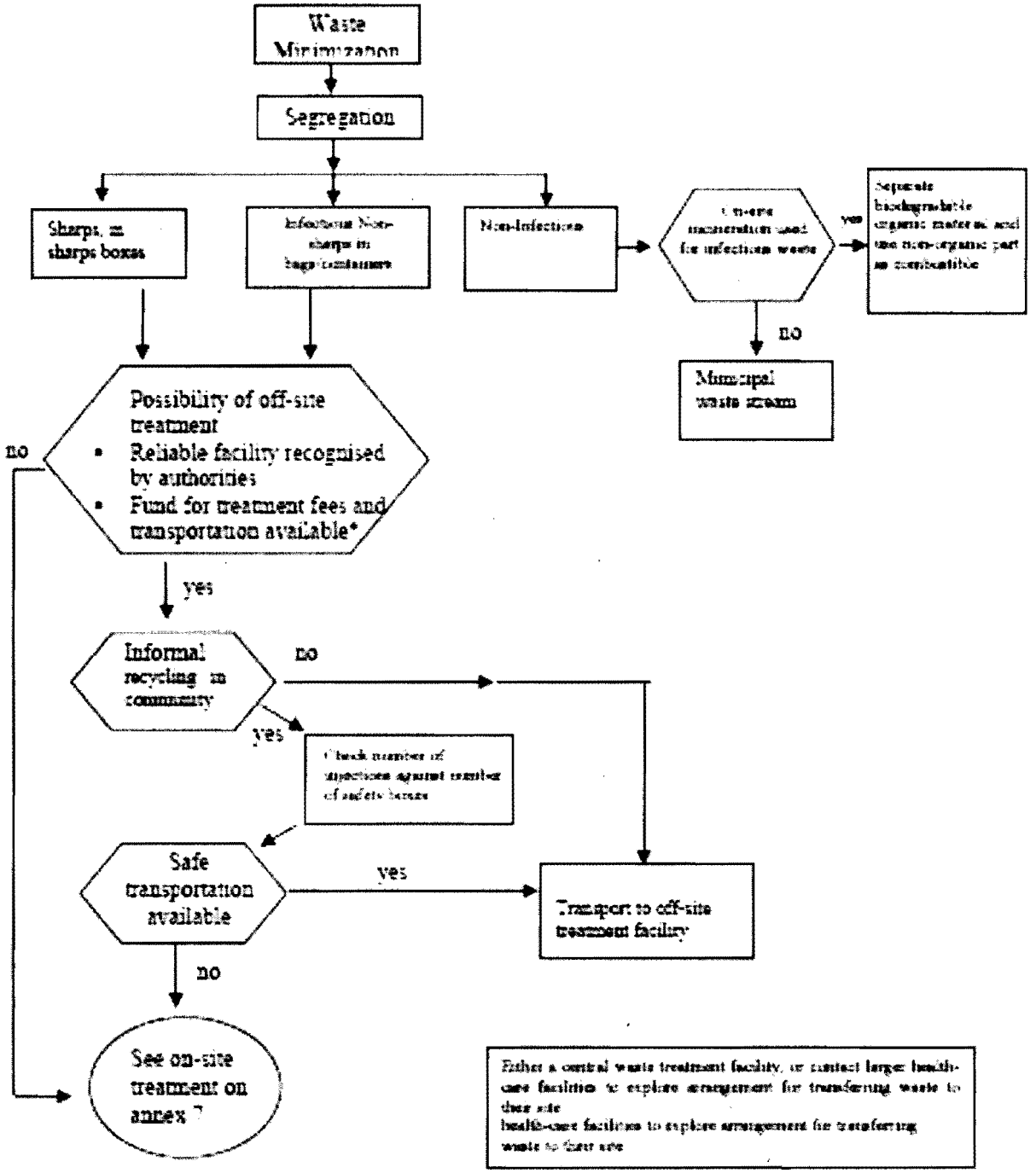
**Scenario 3:** Peri-urban area



## ANNEX 8 HCW FACILITIES OPERATING SCENERIO 4

**Scenario 4:** Rural area without access to modern waste treatment or disposal facility



## ANNEX 9 HCW FACILITIES OPERATING SCENERIO 5

**Scenario 5:** Rural area with access to modern waste treatment or located within reasonable distance of a larger health-care facility with treatment facility.