ANGOLA’S NATIONAL HEALTH CARE WASTE MANAGEMENT PLAN

Prepared under the HAMSET project
Updated under the MHSS Project

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LIST OF ACRONYMS AND ABBREVIATIONS

WB – World Bank
UNICEF – United Nations Children’s Fund
WHO – World Health Organization
ADB – African Development Bank
UNEP – United Nations Environment Program
NGO – Non-Governmental Organization
MINARS - Ministry of Social Reinsertion
HCW – Health Care Waste
HCWM – Health Care Waste Management
HCE – Health Care Establishments
HAMSET –
MHSS -- Municipal Health Service Strengthening

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EXECUTIVE SUMMARY

Angola is located in the occidental region of Austral Africa, occupying an area of 1,246,700 km², being therefore the third largest country within Sub-Saharan Africa.


Nowadays Angola population is estimated to be around 10,978,552 inhabitants, with a population growth rate of 1.93%, therefore statistics foresee a population growth to 14,473,000 inhabitants around 2025.

Main mortality causes in Angola are malaria, acute diarrheic diseases and acute respiratory diseases. During the last few years, HIV/AIDS had increased relevance in terms of morbidity and mortality in Angola.

Statistics show that around the world contamination by HIV/AIDS, through manipulation of contaminated health care waste represents around 0.2%. This represents a serious public health problem and an environmental concern to the Government of Angola within the battle against HIV/AIDS.

Health care waste constitutes an important factor concerning environmental degradation, a factor of significant health risk threatening peoples’ quality of life. Thus, managing correctly this specific kind of waste should represent an important concern for governments and deserve a special attention by institutions and the population in every country.

As well as in every country around the world, in Angola contaminated waste mismanagement (handling, storage and disposal) raises serious environmental and social concerns. There is an urgent need to evaluate health care waste management and disposal, with special attention to the safety related with health care waste infected by HIV/AIDS and by other transmittable diseases such as tuberculosis. A correct Health Care Waste Management should consider topics like policy and legislative/regulations definition, human resources, financial resources allocation and training and awareness raising programs for people involved in the Health Care Waste subject (health care personnel, cleaning personnel, etc.) and also for general population, with regard to: Infectious diseases (like HIV/AIDS), other transmittable diseases (like tuberculosis) or endemic diseases (like malaria).

Estimates on health care waste (HCW) generation: in Angola are around 5,495,951 Kg/year. From those, 20 to 30% are contaminated waste; which means 1,373,988 Kg/year.

In terms of Health Care Waste Management (HCWM), were observed important lacks, especially regarding daily practices and infrastructures.

Segregation at the source is rare and when it occurs, regards only sharps and anatomic pieces (of big dimension) derivative from surgeries.

Waste collection and pre-collection (general and hazardous health care waste) is usually performed through the use of plastic garbage bins, with or without a bag, cardboard boxes or,
sometimes, aluminum garbage bins, with or without cover, within the services. Without distinction, food, medicines, compresses, blood and sore systems, sore bottles, syringes, needles, among other objects, are placed inside the collection equipment.

Health care waste is removed and transported by cleaning personnel, using sometimes wheeled containers/recipients. However, since lack of pre-collection and collection bags is usual, buckets containing waste are transported and unfilled into containers; afterwards, they are washed or cleaned with wet wiper.

Other kinds of waste are placed in garbage buckets or RECOLIX private company containers, located in non-specific rooms or in the HCE’s patios.

In most of the visited HCE’s health care waste are placed, not bagged, in public containers outside, or in public dumps at the back of HCE’s. Those places are easily accessible to people and animals and also exposed to climatic conditions.

In the province of Luanda health care waste follows two distinct ways of elimination. Health care waste collected by private company RECOLIX is sent to incineration, in an incinerator facility owned by the company. Health care waste placed in public containers or dumps are collected by ELISAL and directed to a landfill.

As a result of HCWM practices analysis, some critical factors were identified. These factors are considered essential for the success of any HCWM Plan implementation in the country. Critical factors were identified at the following levels: Organization and Management; Human Resources; Policies, Legislation and Regulation; Sensitization and Training; and Financing and Investment Questions.

Taking into account these factors a plan was defined on five strategic objectives: Strategic Vector 1: Reinforce Institutional, Legislative and Regulating Frame; Strategic Vector 2: Organizing and Managing; Strategic Vector 3: Installing and Equipping; Strategic Goal 4: Training; Strategic Vector 5: Sensitizing and Awareness Raising.

National legislation should be the departure point regarding improving and/or implementing HCWM related practices. Legislation establishes legal controls and licenses, so that the responsible entity (which usually is the Ministry of Health) can assume the referred implementation. In order to achieve strategic vector 1, the following measures should be implemented:

- Constitution of a work group on a central level in order to prepare/elaborate Legislation and Regulations
- Preparation/elaboration of Legislation and Regulations
- Legislation/Regulations approval

Activities like planning, managing, assessing and using information perform very important roles, in order to increase the quality of the services performed, to increase productivity and to improve results in terms of health care waste impact on populations. Strategic Vector 2 consists in providing conditions in order to improve quality of organization and management in health care wastes services. HCE’s generating health care waste should establish a system based on the most appropriate resources in order to achieve a safe and environmental friendly HCWM. The system should start with basic measures and be progressively improved. The first steps comprehend the following items regarding to health care waste: segregation, safe handling, treatment and disposal. Some of the main activities to perform are:

- Human and financial resources allocation;
- Waste minimization, including procurement policies and stocks management practices;
- Assignment of responsibilities regarding waste management;
- Waste segregation into general and hazardous health care waste, and implementation of the correct procedures regarding health care waste: safe handling, storage, transport, treatment and disposal;
- Monitoring health care waste generation and its destination.

The strategic vector 2 will be carried out through the following activities:
- National Starting Conference with the participation of entities directly related with the HCWM sector, public and private, on central and provincial levels;
- Annual National Seminar for evaluating solutions developed in each HCE and presentation of new proposals concerning the improvement of the HCWM plan, with the participation of entities directly related with the HCWM sector, public and private, at central and provincial levels;
- Project of Technical Assistance to the Ministry of Health in order to prepare and organize the HCWM plan;
- Support to HCE’s regarding the elaboration of annual budgets including HCWM related expenses;
- Inspection, assessment and evaluation of the HCWM plan implementation;
- Support with regard to the collect, processing and saving statistic data obtained in the HCE’s.

In order to develop activities to consolidate a HCWM Plan, some practical conditions are mandatory. These conditions should constitute the best possible background for waste collect, treatment, transport and disposal. Without appropriate structures and equipment no HCWM related interventions are possible within the HCE’s.

This third strategic vector consists of the analysis of the available technologies and on the subsequent presentation of suitable suggestions (adjusted for each case) regarding equipment acquisition and structures construction or rehabilitation, in order to provide the country with better health care waste treatment and disposal conditions. Foreseen actions in order to implement this strategic goal are:
- Study, wide-ranging all provinces, on most adequate solutions and it’s quantification, since the previous assessment considered only five (5) provinces;
- Administrative procedures for buying equipment;
- Meetings with the HCE’s to assess the current situation and equipment supply;
- Material and equipment distribution;
- Building and rehabilitating HCWM infra-structures.

Solutions suggested in terms of equipment are:
- Providing HCE’s with buckets (1/Center; 10/Hospital), trolleys (1/Center; 4/Hospital), sharps containers, protective clothing, storage equipment and sharps destroyers;
- Rehabilitating structures;
- Provide each province with one autoclave for sterilization;
- Provide each province with a double chamber incinerator;
- Provide each municipality with a “Montfort” type incinerator;
- Provide HCE’s with cesspits (1/Center; 10/Hospital);
- Provide HCE’s with sharps destroyers (1/Center; 10/Hospital)

Concerning Luanda province, the solution suggested is the improvement of the operation conditions of the existing incinerator facilities, complementing it with the use of an autoclave. Moreover, possible joint ventures including RECOLIX private company, municipalities and HCE’s should be analyzed.
Investment on citizen’s training is a mandatory condition for development. Beyond the regular functioning of the regular teaching system (basic school, secondary school and university), there is a need for professional training, namely training for the personnel who is directly involved in the HCWM processes.

The training plan will include several courses with several formats:
On a central level a Training of Trainers course (HCWM trainers) will be carried out.
On a provincial level the following courses will take place:
- Training course on organization and HCWM within HCE’s;
- Training course for maintenance and collect / cleaning personnel;
- Training courses for health care professionals;
- Training courses landfills and incinerator operators.

Projects can only be implemented if people are aware of their importance. General population (including a special attention to youth) and particularly involved agents should be strongly sensitized, so that a HCWM program can be successfully implemented. For that purpose, it is required that the message is assimilated by the population. As mentioned, there are three target groups with different communication related requirements: health care personnel, youth and general population.

Regarding the entire project, an external evaluation will be performed in three distinct moments: at the beginning of the project, in the middle of the project and at the end of the project.

The execution of this plan can only be truly efficient with continuous and proactive cooperation of some entities and agents who are directly related with health care waste management issues. Synergies created by the foreseen team-work will allow to face with more optimism this important Angolan problem.

The main involved entities are the Central Government, the Ministry of Health, the Ministry of Education, the Ministry of Public Works, Provincial Governments and Municipalities, Public and Private Health Establishments, NGOs, Community Organizations, Religious Organizations, the Media, and several Development Partners (WB, UNICEF, WHO, ADB, bilateral cooperation, etc).

Evaluation of the needs led to the elaboration of a budget of 5,416,676 $USD of total expenses, according to the following financing plan: 366,100 $USD on year 1, 1,750,442 $USD on year 2, 3,461,018 $USD on year 3, 654,992 $USD on year 4 and 263,325 $USD on year 5.

The quantification of presented needs correspond to a minimum platform for the improvement of the Health Care Waste Management System. The goal of this minimum platform is to conciliate suitable solutions, in order to guarantee health care waste disposal, with controlled environmental impact, and reasonable investments.

The presented proposals are beneath the necessities, both in terms of quantity and in terms of quality. The achievement of a reasonable solution was always our orientation.

Estimated annual capacity of health care waste incineration, by the proposed equipment is around 3,887,250 kg, therefore insufficient. Indeed, the estimate of annual production is 5,495,951 kg. Thus, there is still a deficit of 1,608,701 kg. This means the existence of waste without any treatment or proper disposal after the conclusion of the project. This subject should be worthy of a special attention for the post-project phase.
In a second phase of implementation of the Health Care Waste Management Plan there will be the opportunity to install other waste treatment and disposal facilities, more “environmentally friendly”. Also, it will be possible perform these improvements within a larger number of HCE’s.

The control of all the health care waste in such a vast country, like Angola is, will have to be attained in a progressive way. “Good practices” meanwhile acquired should be used for that purpose. Thus, both investments and the “non-material” component of each project phase are more level-headed. Therefore, it is possible to get a better relation between cost and benefit and much more obvious social and environmental impacts.

1. INTRODUCTION

Health care waste constitutes an important factor concerning environmental degradation, a factor of significant health risk, threatening peoples’ quality of life. Thus, managing correctly this specific kind of waste should represent an important concern for governments and deserve a special attention by institutions and also by the whole population in each single country.

In many countries, improper handling of materials contaminated with HIV/AIDS has great consequences among people involved in health care waste related issues, like people who work within the health care establishments (HCE’s), in the municipalities, and their families. Also, among general population some people (particularly children who live on the streets), usually search for reusable materials in landfills and public dumps. This activity is even graver because it leads to the manipulation and use of contaminated waste, increasing environmental and sanitary risks.

Statistics show that around the world the contamination by HIV/AIDS, through manipulation of contaminated health care waste, represents around 0.2%. This problem represents a serious public health problem and an environmental concern to the government of Angola within the fight against HIV/AIDS.

This is the general context in which the HAMSET and the MHSS programs are justified.

In consequence of health care services, significant quantities of health care waste are generated, in different categories: sharps (needles, scalpels, blades, etc.), non-sharps (blood and other body fluids, infected or not, chemicals, pharmaceutical products), and medical equipment.

As a result of a health care waste mismanagement, the risk of infection is higher among health care professionals, cleaning and sweeping personnel, maintenance personnel, patients and visitors, as well as within the community as a whole.

The definition and implementation of a suitable Health Care Waste Management Plan is an important step leading to increased quality of life, health related costs reduction and new recycling opportunities.

A proper Health Care Waste Management should consider topics like policies and laws/regulations definition, human resources, allocation of financial resources and training and awareness raising programs, for people involved in the Health Care Waste subject (health care personnel, cleaning personnel, etc.) and also for general population, regarding infectious diseases (like HIV/AIDS), other transmittable diseases (like tuberculosis) or endemic diseases (like malaria).
The Angola HAMSET project includes four components, related to:

a) The public sector (creation of structural capabilities and support to the main orientations for reducing the impact of AIDS, malaria and tuberculosis on the patients and on the community).
c) The community, namely in terms of community-related initiatives in order to face the challenges resulting from epidemics like HIV/AIDS, malaria and tuberculosis.
d) The co-ordination of the program

The HAMSET project is a result of a previous assessment on the current situation in terms of Health Care Waste Management (HCWM) in Angola, based on local visits and interviews with ministries, province governments, private companies and health care establishments. In general terms the current system has shown to be obsolete and non-effective.

The MHSS project would have three components: (i) improving service delivery in five provinces of Bengo, Malange, Lunda Norte, Moxico, and Uige; (ii) piloting of demand-side incentives to increase institutional deliveries; and (iii) strengthening the capacity of the MOH and municipalities.

The project would support an integrated model of health service delivery consisting of: (i) health facilities providing a complete package of basic health care services; (ii) outreach teams that would start from health facilities and visit municipalities according to a regular schedule, bringing preventive and simple curative services to the population, and (iii) community health workers, supervised by outreach teams, who would mobilize communities, promote healthy behavior in the population, help recognize early signs of illness, and encourage the population to seek care from mobile outreach teams of health facilities when possible.

As well as in every country around the world, in Angola contaminated waste management (handling, storage and disposal) raises serious environmental and social concerns. There is an urgent need to evaluate health care waste management and disposal, with special attention to safety related with health care waste infected by HIV/AIDS, and by other transmittable diseases such as tuberculosis and malaria.

The MHSS project includes a subcomponent related to the Improvement of hospital waste management. The project would finance the provision of waste disposal equipment, protective clothing, consultants, and training in waste management in the provincial and municipal hospitals of the five selected provinces as contribution to the National HCWM Plan.

The main objective of this subcomponent is to build on the experiences achieved under the HAMSET project and start scaling up successful activities to more provinces. The MHSS project proposes to extend training, public awareness, provisions of protective clothing and basic equipment to five provinces. This will help achieve some of the strategic objectives outlined in the Angola National Health Care Waste Management and Disposal Action Plan.

The main phases of the above mentioned study comprehend:

a) Assessment on the existing policies and current practices;
b) Evaluation of available technological, implementation and financing options
c) assessment on awareness levels (regarding health care waste) among health care professionals

d) assessment on the existing training programs

The outcome of this study should include:

- Political and legislative frame in order to rule and reinforce appropriate practices in terms of health care waste management;
- Training and awareness programs needs, among health care professionals and general population;
- Investment plan in disposal technologies;
- Use of surveys / public consultation as a current method within the study.

Activities integrated in this wide program demand a rigorous assessment of all topics related with technological issues and engineering techniques, and social services. Foreseen technical assistance, within the above mentioned program, requires important management activities (project management, assessment, inspection and control). These activities are crucial in order to achieve positive results, namely for obtaining a better efficiency from the investments done.

In many developing countries, non-appropriate policies, legislation, strategies, control or evaluation systems are causes for health care waste mismanagement. This mismanagement can result in serious consequences regarding public health and environment. As a consequence, medical and support staff, patients and general population, are increasingly exposed to health-related risks that could and should be avoided.

A planning process regarding Health Care Waste Management within HCE’s reduces in a significant way the impacts of health care hazardous waste. This planning implies items like financial issues, human resources development, responsibilities and rules to be assumed by all the personnel involved in Health Care Waste Management. In this particular field, handling, storage, treatment and disposal are essential technical topics.

The development of a Health Care Waste Management Plan reduces the probability of accidents and improves the working conditions within health care facilities. Moreover, it approaches health care establishments and national and provincial entities and authorities, elements that are the components of a national Health Care Waste Management system.

A planned Health Care Waste Management disciplines a safer use of resources related to waste handling, storage, treatment and disposal. Experience shows that this kind of planning within health establishments leads to better hygiene practices and contributes to operational improvement within the existing health care system.

The development of specific HCWM plans must be adequate to the specific dimension and typology of each health care establishment and should count on the continuous cooperation involving the different implicated agents, public and private.

2. COUNTRY’S PRESENTATION

2.1. Geographical Data and Administrative Division

Republic of Angola is situated on in the occidental region of Austral Africa, bordering the South Atlantic Ocean, between Namibia and Democratic Republic of the Congo. Angola occupies a
Angola's National Health Care Waste Management Plan

Angola's National Health Care Waste Management Plan

surface of 1,246,700 sq km (with a coastline of 1,650 Km² and land boundaries of 4,837 Km²), being, therefore, the third largest country within Sub-Saharan Africa.

In terms of the geomorphologic point of view, Angola has six big areas with specific characteristics: the coastline strip, the transition area (between coastline strip and the interior), the marginal mountain chain, the central plateau, the Zaire River basin and the Cunene and Cubango rivers basins. 60% of the Angolan territory is constituted by plateaus ranging from 1,000 to 2,000m with a dense and extensive hydrographic system. The main Angolan Rivers are Kwanza, Cunene and Cubango: respective hydrographic basins occupy an important part of the territory.

Angola is bordered by the Democratic Republic of Congo to the north, Zambia to the east, Namibia to the south and the Atlantic Ocean to the west. Mountains rise from the coast, leveling to a plateau which makes up most of the country. The country is increasingly arid towards the south; the far south is on the edge of the Namibe Desert. The northern plateau is thickly vegetated. The lowest point of Angola is the Atlantic Ocean at 0 m and the highest point is Morro de Moco at 2,620 m.

Because of its situation in the inter tropical and subtropical areas, due to the cold “Benguela” stream and to its terrain characteristics, Angola presents two different climatic regions: littoral and interior, the latter including three sub-areas (North, Southeast and Altitude area) with significant variations of temperature and rainfall. Angola has two climatic seasons: the “Cacimbo” season (dry and less hot) from May to September and the rainy season (humid and warmer) from September to May with temperatures ranging from 27 ºC (maximum average temperature) and 17 ºC (minimum average temperature).

The official language is Portuguese, widely used within the country. African languages (Umbundu, Kimbundu, Kikongo and Chokwe being the most common) are also spoken.


Democratic Republic of Angola’s capital is Luanda, located at Luanda Province. This Province occupies an area of 2,417.78 Km² (0.19% of total area of the country), divided in 9 municipalities: Cacuaco, Cazenga, Ingombotas, Kilamba Kiaxi, Maianga, Rangel, Samba, Sambizanga and Viana, 24 wards and 5 communes.

The Cabinda Province is a small enclave on the north of Angola, occupies an area of 7,270 Km², surrounded by the territories of the Democratic Republic of Congo and the Congo. The capital is Cabinda and the Province is divided in 4 municipalities: Cabinda, Cacongo, Buco-Zau and Belize.

The Lunda Norte Province, whose capital is Dundo, occupies an area of 103,000 Km² and it is divided in 9 municipalities: Tchitato, Cambulo, Chitato, Cuilo, Caungula, Cuango, Lubalo, Capenda Camulemba and Xá Muteba.
The Lunda Sul Province, whose capital is Saurimo, occupies an area of 77,637Km$^2$ and it is divided in 4 municipalities: Saurimo, Dala, Muconda and Cacolo.

The Zaire Province, whose capital is M Banza Kongo, occupies an area of 40,130Km$^2$ and it is divided in 6 municipalities: M Banza Kongo, Soyo, N Zeto, Cuimba, Noqui and Tomboco.

The Uíge Province, whose capital is Uíge, occupies an area of 58,698Km$^2$ and it is divided in 15 municipalities: Zombo, Quimbele, Damba, Mucaba, Macocola, Bembe, Songo, Buengas, Sanza Pombo, Ambula, Uíge, Negage, Puri, Alto Caule and Quirexe.

The Bengo Province, whose capital is Caxito, occupies an area of 33,016Km$^2$ and it is divided in 5 municipalities: Dande, Ambriz, Icolo e Bengo, Muxima and Nambuangongo.

The Kwanza Norte Province, whose capital is N’Dalatando, occupies an area of 24,110Km$^2$ and it is divided in 13 municipalities: Cazengo, Lucala, Ambaca, Golungo Alto, Dembos, Bula Atumba, Cambambe, Quiculungo, Bolongongo, Banga, Samba Caju, Gonguembo, Pango and Aluquem.

The Malanje Province, whose capital is Malanje, occupies an area of 97,602Km$^2$ and it is divided in 14 municipalities: Massango, Marimba, Calandula, Caombo, Cunda-Dia-Baza, Cuacuzo, Cuaba Nzogo, Quela, Malanje, Mucari, Cangandala, Cambundi-Catembo, Luquembo and Quirima.

The Kwanza Sul Province, whose capital is Sumbe, occupies an area of 55,660Km$^2$ and it is divided in 12 municipalities: Sumbe, Porto Amboim, Quibala, Libolo, Mussende, Amboim, Ebo, Quilenda, Conda, Waku Kungo, Seles and Cassongue.

The Benguela Province, whose capital is Benguela, occupies an area of 31,78Km$^2$ and it is divided in 9 municipalities: Lobito, Bocoio, Balombo, Ganda, Cubal, Caiambambo, Benguela, Baña Farta and Chongoroi.

The Huambo Province, whose capital is Huambo, occupies an area of 34,270Km$^2$ and it is divided in 11 municipalities: Huambo, Lundoimbale, Bailundo, Mungo, Tchindjenje, Ucuma, Ekonha, Tchicala-Tchoaloanga, Catchiungo, Longongo and Caála.

The Bié Province, whose capital is Kuito, occupies an area of 70,314Km$^2$ and it is divided in 9 municipalities: Kuito, Andulo, Nharea, Cuemba, Cunhinga, Catabola, Camacupa, Chinguar and Chitembo.

The Moxico Province, whose capital is Luena, occupies an area of 223,023Km$^2$ and it is divided in 9 municipalities: Moxico, Camanonque, Léua, Cameia, Luau, Lucano, Alto Zambéze, Luchazes and Bundas.

The Namibe Province, whose capital is Namibe, occupies an area of 58,137Km$^2$ and it is divided in 5 municipalities: Namibe, Camacuio, Bibala, Virei and Tombwa.

The Huila Province, whose capital is Lubango, occupies an area of 75,002Km$^2$ and it is divided in 13 municipalities: Quilengues, Lubango, Humpata, Chibia, Chiance, Quipungo, Caluquembe, Caconda, Chicomba, Matala, Jamba, Chipindo and Kuvango.

The Cunene Province, whose capital is Ondjiva, occupies an area of 87,342Km$^2$ and it is divided in 6 municipalities: Cuanhama, Ombadjia, Cuvelai, Curoca, Cahama and Namacunde.
The Cuando-Cubango Province, whose capital is Menongue, occupies an area of 199,049Km² and it is divided in 9 municipalities: Menongue, Cuito Cuanavale, Cuchi, Cuangar, Longa, Mavinga, Calai, Dirico and Rivungo.

2.2. Demographic data and health statistics

2.2.1. Demographic data

Nowadays Angola population is estimated to be 10,978,552 inhabitants, with a population growth rate of 1.93%, therefore statistics foresee a population growth to 14,473,000 inhabitants in 2025.

In general terms, a strong demographic dynamic exists, as well as uneven population growth and distribution. An increased urbanization is also notorious.

Migrations resulting from war changed deeply national population dimension and distribution. In Luanda Province, initially conceived for 600 thousand people, live 4 million people nowadays. Moreover, population growth is continuous. Reliable information reveals that 2,450,000 of those 4 million people are displaced people. However, only a million of those citizens are controlled by the Provincial Direction for Social Reintegration (MINARS).

<table>
<thead>
<tr>
<th>Demographic Indicators: 2000 and 2025 estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
</tr>
<tr>
<td>Births per 1,000 population</td>
</tr>
<tr>
<td>Deaths per 1,000 population</td>
</tr>
<tr>
<td>Annual rate of growth (percent)</td>
</tr>
<tr>
<td>Life expectancy at birth (years)</td>
</tr>
<tr>
<td>Infant deaths per 1,000 live births</td>
</tr>
<tr>
<td>Total fertility rate (per woman)</td>
</tr>
</tbody>
</table>

Table 1: Demographic Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Year</th>
<th>Population</th>
<th>Period</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>4,797</td>
<td>1996</td>
<td>9,443</td>
<td>1960-1970</td>
<td>1.6</td>
</tr>
<tr>
<td>1980</td>
<td>6,736</td>
<td>1998</td>
<td>9,736</td>
<td>1980-1990</td>
<td>1.8</td>
</tr>
<tr>
<td>1990</td>
<td>8,049</td>
<td>1999</td>
<td>9,922</td>
<td>1990-2000</td>
<td>2.3</td>
</tr>
<tr>
<td>2000</td>
<td>10,132</td>
<td>2010</td>
<td>12,250</td>
<td>2000-2010</td>
<td>1.9</td>
</tr>
<tr>
<td>2001</td>
<td>10,342</td>
<td>2020</td>
<td>14,473</td>
<td>2010-2020</td>
<td>1.7</td>
</tr>
<tr>
<td>2002</td>
<td>10,554</td>
<td>2030</td>
<td>16,886</td>
<td>2020-2030</td>
<td>1.5</td>
</tr>
<tr>
<td>2003</td>
<td>10,766</td>
<td>2040</td>
<td>19,354</td>
<td>2030-2040</td>
<td>1.4</td>
</tr>
<tr>
<td>2004</td>
<td>10,979</td>
<td>2050</td>
<td>21,688</td>
<td>2040-2050</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 2: Midyear population estimates and average annual period growth rates (1950 to 2050).

Population in thousands, rate in percent.

<table>
<thead>
<tr>
<th>AGE</th>
<th>TOTAL</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2025</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>10,132</td>
<td>5,124</td>
<td>5,008</td>
</tr>
<tr>
<td></td>
<td>15,656</td>
<td>7,899</td>
<td>7,757</td>
</tr>
</tbody>
</table>

Table 3: Population by sex and age.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male 2000</th>
<th>Female 2000</th>
<th>Male 2025</th>
<th>Female 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>1,744</td>
<td>879</td>
<td>2,335</td>
<td>1,180</td>
</tr>
<tr>
<td>5-9</td>
<td>1,435</td>
<td>725</td>
<td>2,090</td>
<td>1,054</td>
</tr>
<tr>
<td>10-14</td>
<td>1,213</td>
<td>614</td>
<td>1,915</td>
<td>968</td>
</tr>
<tr>
<td>15-19</td>
<td>1,024</td>
<td>519</td>
<td>1,766</td>
<td>897</td>
</tr>
<tr>
<td>20-24</td>
<td>887</td>
<td>451</td>
<td>1,586</td>
<td>809</td>
</tr>
<tr>
<td>25-29</td>
<td>769</td>
<td>386</td>
<td>1,353</td>
<td>692</td>
</tr>
<tr>
<td>30-34</td>
<td>681</td>
<td>343</td>
<td>1,098</td>
<td>565</td>
</tr>
<tr>
<td>35-39</td>
<td>585</td>
<td>300</td>
<td>947</td>
<td>533</td>
</tr>
<tr>
<td>40-44</td>
<td>435</td>
<td>235</td>
<td>645</td>
<td>330</td>
</tr>
<tr>
<td>45-49</td>
<td>348</td>
<td>187</td>
<td>339</td>
<td>156</td>
</tr>
<tr>
<td>50-54</td>
<td>294</td>
<td>150</td>
<td>292</td>
<td>156</td>
</tr>
<tr>
<td>55-59</td>
<td>243</td>
<td>118</td>
<td>368</td>
<td>194</td>
</tr>
<tr>
<td>60-64</td>
<td>202</td>
<td>93</td>
<td>292</td>
<td>135</td>
</tr>
<tr>
<td>65-69</td>
<td>141</td>
<td>64</td>
<td>186</td>
<td>99</td>
</tr>
<tr>
<td>70-74</td>
<td>78</td>
<td>36</td>
<td>117</td>
<td>64</td>
</tr>
<tr>
<td>75-79</td>
<td>37</td>
<td>17</td>
<td>68</td>
<td>39</td>
</tr>
<tr>
<td>80+</td>
<td>17</td>
<td>7</td>
<td>41</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, International Data Base, September 2004 version.
2.2.2. Health Statistics

Main mortality causes in Angola are malaria, acute diarrheic diseases and acute respiratory diseases. During the last few years, HIV/AIDS had increased relevance in terms of morbidity and mortality in Angola.

As it can be observed on the following table, birth and mortality rates are high. Fertility and child mortality rates are very significant. As referred, HIV/AIDS rate is already significant.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy at birth (2004 estimate)</td>
<td>36.79 years</td>
</tr>
<tr>
<td>Birth rate (2004 estimate)</td>
<td>46.54 births/1,000 population</td>
</tr>
<tr>
<td>Death rate (2004 estimate)</td>
<td>25.86 deaths/1,000 population</td>
</tr>
<tr>
<td>Total fertility rate (per woman/2004 estimate)</td>
<td>6.33</td>
</tr>
<tr>
<td>Infant deaths per 1,000 live births (2003 estimate)</td>
<td>198</td>
</tr>
<tr>
<td>People living with HIV/AIDS(2003 estimate)</td>
<td>3.9%</td>
</tr>
<tr>
<td>Deaths caused by HIV/AIDS</td>
<td>21,000</td>
</tr>
</tbody>
</table>

Source: CIA – The World Fact Book

Table 4: Health Indicators

The following table refers to human resources existing within Angola health care system, distributed by professional categories.

<table>
<thead>
<tr>
<th>PROFESSIONALS</th>
<th>Year 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Doctors</td>
<td>811</td>
</tr>
<tr>
<td>Non Medical Highly Skilled</td>
<td>42</td>
</tr>
<tr>
<td>Technicians</td>
<td></td>
</tr>
<tr>
<td>Senior nurses/ Matrons</td>
<td>163</td>
</tr>
<tr>
<td>Nurses</td>
<td>16,451</td>
</tr>
<tr>
<td>X - Rays Technicians</td>
<td>566</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>716</td>
</tr>
<tr>
<td>Laboratory Technicians</td>
<td>1,422</td>
</tr>
<tr>
<td>Dental</td>
<td>235</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>118</td>
</tr>
<tr>
<td>Orthopedists</td>
<td>128</td>
</tr>
<tr>
<td>Dietitians</td>
<td>11</td>
</tr>
<tr>
<td>Medical Statistic</td>
<td>274</td>
</tr>
<tr>
<td>Electroencephalogram</td>
<td>2</td>
</tr>
<tr>
<td>Pathologic Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>122</td>
</tr>
<tr>
<td>Administrative Personnel</td>
<td>20,221</td>
</tr>
<tr>
<td>Support staff</td>
<td>4,754</td>
</tr>
<tr>
<td>Volunteers</td>
<td>5,379</td>
</tr>
</tbody>
</table>

Source: Angola Health Ministry

Table 5: National Health Care Professionals

2.3. Legal and political framework
2.3.1 Health and environmental policies

Health policy developed by the government of Angola is executed by the ministry of Health, through its ramifications. This policy is reflected in the main national health goals: sanitary development, increasing access to health care services and improvement of health care services' quality.

Law nº 21-A/92 (Basic Law on National Health System) establishes major orientations of the health care policy. Article19, in 2nd chapter, determines the competence of provincial health care authorities, defining that these entities can propose activity plans and respective budget, as well as keep up with its execution and reports. Article 31 in the third chapter, regulates the support given to the private sector and Article 33 concerns to private institutions (with non-lucrative purposes) performing within the health care sector.

Law nº 5/87 (Sanitary regulation of Angola) establishes the competence of Sanitary Authorities and Sanitary and Mortuary Police, determines the obligation of participation of transmissible diseases to authorities is mandatory and defines steps to be followed in those cases. This law comprises also inspection of food quality standards.

Environmental Policy developed by the Government of Angola is described within the Decree N° 51/94, issued on the 23rd of July, –Main National Law on Environment. It defines basic concepts and principles concerning environment protection and conservation, quality of life, promotion and rational use of natural resources. According to this Law 1st article, “the Government must issue and enforce legislation in order to control production, emission, deposit, import and management of solid, liquid and gaseous pollutants”. Within this law is also included the environmental education issue.

As a follow-up of this Law, another Law was issued, on general principles related to water and water related resources. (Law nº 6/02 - Water Related Law).

In its 67th article, forbidden activities are described. In particular, paragraph b) mentions the prohibition of “accumulating solid waste, or any other substances in locations and conditions that contaminate or create the possibility of water contamination”.

Presently there isn’t any legal framework regarding to HCW, or any activity related with HCW handling, treatment or disposal. However there is a draft of a Health Care Waste Management Plan at the HCE’s level.

2.3.2 National Health Care System Organization:

According to Law nº 21-B/92, issued on the 28th of August – Main Law on the Health Care System - article 1st, defines that health care services exist at three levels:

a) Primary level of Health Care Services
b) Secondary Level or General Hospitals System
c) Third Level or Particular Hospitals System

According to this Law, basic structures of National Health Care System and its coverage are the following: Health Care Post, Health Care Center, Reference Health Care Center/Municipal Hospitals, General Hospital, Central Hospital and Special Services Establishments. This law also describes the different basic health care structures and respective competencies and obligations.
According to the organic statute of the ministry of health, administrative structure of the ministry of Health, centrally coordinated by the ministry, is organized according with the following organization chart.
MINISTRY OF HEALTH STRUCTURE

Figure 3: Ministry of Health Structure
2.3.3 Health care establishments distribution

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>TOTAL UNITS</th>
<th>HOSPITALS</th>
<th>HEALTH CARE CENTERS</th>
<th>HEALTH CARE POSTS</th>
<th>HAB./HCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>NF</td>
<td>F</td>
<td>NF</td>
<td>Total</td>
</tr>
<tr>
<td>Bengo</td>
<td>37</td>
<td>59</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Benguela</td>
<td>100</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bié</td>
<td>46</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cabinda</td>
<td>94</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Huambo</td>
<td>87</td>
<td>87</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Huila</td>
<td>126</td>
<td>169</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cuando Cubango</td>
<td>27</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kwanza Norte</td>
<td>41</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kwanza Sul</td>
<td>131</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cunene</td>
<td>62</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Luanda</td>
<td>59</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Lunda Norte</td>
<td>22</td>
<td>38</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lunda Sul</td>
<td>38</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malange</td>
<td>78</td>
<td>51</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moxico</td>
<td>164</td>
<td>117</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Namibe</td>
<td>41</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uige</td>
<td>79</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zaire</td>
<td>42</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,274</td>
<td>830</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Provincial Delegations, National Health and Statistics Department, Ministry of Health of Studies, Planning and Statistics (2002)
F= Functional NF= Non Functional

Table 6: Distribution of Health Care Establishments in Angola

3 HEALTH CARE WASTE MANAGEMENT IN ANGOLA:
ASSESSMENT ON THE CURRENT SITUATION

3.1. Existing practices

Visits and interviews were performed within the following HCE’s:

Luanda Province:
- Josina Machel Hospital
- Augusto N’Gangula Maternity
• Américo Boavida Central Hospital
• David Bernardino Pediatric Hospital
• Prenda Hospital
• Kilamba-Kíaxi Hospital
• Cajueiros Hospital
• Anglodente Private Clinic
• Sagrada Esperança Private Clinic

Bengo Province:
• Ambriz Hospital
• Catete Hospital

Cabinda Province:
• Cabinda Central Hospital
• Military Hospital

Huíla Province:
• A. Agostinho Neto Central Hospital
• Pioneiro Zeca Pediatric Hospital
• Mitcha Health Center
• Tchioco Health Center

These visits allowed to find certain similarities in terms of HCWM practices regarding the group of visited HCE’s. An exception occurred, though: Sagrada Esperança Private Clinic, in Luanda, not only has clearly a better performance in terms of HCWM as possesses adequate and functioning disposal equipment.

a) Health Care Waste Collection:

General and hazardous waste (including contaminated health care waste) pre-collection and collection are usually performed through the use of plastic buckets (with or without a bag inside), cardboard boxes or, in some cases, aluminum buckets (with or without a cover).

Without distinction, all collection equipment receives food, medicines, used compresses, sore bottles, syringes, needles, etc. Frequently, collect equipment is placed in the wards. However, in certain cases, nurses use treatment trolleys containing waste buckets (made of plastic, aluminum or cardboard), in order to receive waste generated within health care treatments, like cotton, compresses, syringes, needles, etc.

Nevertheless, poor hygiene practices are frequent and notorious within HCE’s. Sometimes, solid and liquid waste can be found on the floor.

Without exception, liquid waste is sent through restrooms and laboratories’ sinks.
b) Cleaning Teams

Some HCE’s, in Luanda Province, established contracts with private cleaning companies. However, within most HCE’s, specially in the provinces, cleaning is performed by HCE’s internal cleaning teams.

These cleaning teams are composed mostly by female employees, who, within HCE’s, are in charge of cleaning and waste pre-collection, collection and (frequently) storage.

Health care waste is removed and transported by the referred employees, using in some cases wheeled containers/recipients. However, since lack of pre-collect and collect bags is usual, buckets containing waste are transported and unfilled into containers; afterwards, they are washed or cleaned with wet wiper.
In general terms, cleaning staff does not always use protective clothing, like gloves and masks, although private cleaning companies usually provide this kind of equipment to their employees.

![Figure 9: Cleaning Personnel](image)

**c) Health Care Waste Segregation**

Waste segregation practices depend on the specific HCE’s services, but usually when performed segregation regards only needles, other sharps and, in some cases, placentas. Indeed, within most of the health care establishments health care waste is not segregated.

As an exception, needles are chosen and stored in sore bottles, plastic bottles or recovered juice packs. Full bottles are later placed in the storage containers together with the remaining waste; however it is frequent to find needles and other sharps in garbage buckets.

Nevertheless, three exceptions were found:

- at “Sagrada Esperança Private Clinic” (Luanda);
- At the “Agostinho Neto Central Hospital” Hemotherapy Unit, in Huíla Province, there are plastic receptacles resistant to sharps puncture, hermetic and with destination to incineration;
- At Tchioco Health Center there are cardboard boxes destined to incineration, supplied by UNICEF.

In the blood banks area, bags with blood declared HBS (hepatitis B) or to HIV (AIDS) positive are chosen, separated and stored apart in a refrigerating equipment before disposal (performed at Luanda province, in “Américo Boavida Central Hospital”).

Petri boxes containing cultures are placed apart and sterilized by autoclave before rejection in common garbage bins.

Bigger anatomical parts, derivative from surgeries are lead for burial on cemeteries. Particularly, in the case of the Luanda Province those anatomical parts are sent to “Américo Boavida” Central Hospital, which redirects them for burial.
In some HCE’s, mainly within the capital, segregation is also performed in the childbirth rooms. Childbirth derivatives (liquid derivatives and placentas) are placed in plastic bags, which are later tied, directed for temporary storage location (usually restrooms) and later placed in containers belonging to RECOLIX (health care waste related company). Within the provinces the situation is different, in most of the HCE’s childbirth derivatives are bagged and placed in the public container or public dumps. In Mitcha and Tchioco Health Centers (both in the Province of Huila), childbirth derivatives are often taken by the familiar ones.

Generally, dirty clothes are sent separately to the laundries. Frequently patients bring their own bed-clothes. In such cases the familiar ones usually wash clothes at home.
d) Temporary Storage

Most of the waste collected in the different health care services is not stored separately. Needles are the exception. They are at first placed in plastic or sore bottles or juice packs and afterwards placed together with the other waste.

Remaining waste is placed into garbage buckets or RECOLIX containers, located in non-specific rooms or in the HCE’s yards. Thus, storage is practiced in restrooms, near washbasins, corridors or in HCE’s yards.

Figure 15: Temporary storage location

Figure 16: Temporary storage location

Figure 17: Temporary storage location

Figure 18: Temporary storage location

Figure 19: Temporary storage location
e) Waste Transportation within HCE’s

In the majority of HCE’s, waste transportation is performed by the cleaning staff.

Waste is carried in bags or buckets, with or without a wheeled support. Waste is carried to disposal locations, without any kind of protection, at any time of the day, even during the rush hour.

Waste evacuation is constant, even in those periods when HCEs are crowded (of bigger affluence) (neither personnel nor waste are properly protected). Indeed, generally no protective clothing is used. Sometimes, dirty clothes are carried through wheeled support.

![Figure 20: Wheeled support for waste transport (“Josina-Machel” Hospital)](image)

f) Storage within the HCE’s

In most of the visited HCE’s waste is placed, not bagged, in public containers outside or in dumps at the back of HCE’s, places that are easily accessible to people and animals and also exposed to climatic conditions.

It must be enhanced that, due to high poverty levels, it is frequent to find people seeking for reusable materials in those places.

In certain HCE’s, like in “Sagrada Esperança Private Clinic” and “David Bernardino Pediatric Hospital”, both in Luanda, waste is placed in a closed storage room, exterior to the main building. Those rooms are only opened when collection by municipal services or private company RECOLIX occurs. However, in the previous referred HCE, the garbage room is frequently open, permitting people and animals entry.
g) Recovery / Reuse

Materials used during surgeries (clamps, shears, etc.) are sterilized by autoclave or hot oven and reused. Glassware used in laboratories is also used after being washed or disinfected.

h) Transport to disposal locations

In most cases, this transport is performed by the municipal services. Therefore, contaminated health care waste and general waste have the same destination. Regarding some HCE’s in Luanda Province, waste is carried by private company RECOLIX, which collects them daily. Generally,
service frequency assured by the municipalities is not regular. Normally, collect occurs with large intervals. Usually it takes weeks between one collect and other.

i) Treatment and disposal systems / disposal location

Waste segregated at the source, particularly needles, is usually reintroduced into common waste circuit at collect or temporary storage levels. Therefore, general waste and contaminated health care waste have the same final destination. This is particularly dangerous for medical and cleaning personnel, within HCE’s, and for waste collecting personnel working in municipal services.

In Luanda province health care waste is disposed in two distinct ways. Waste collected by private company RECOLIX is sent to incineration, in an incinerating facility belonging to the company. This incinerating structure is new, has high performance capacity and is in good operating conditions. However, the firm is facing financial problems due to expenditures with vehicles as a result of bad road infrastructures conditions.

Concerning to waste placed in public containers or dumps in the backs of the HCE’s, it is collected by the company ELISAL and directed to a landfill.

“Américo Boavida Hospital” and “David Bernardino Pediatric Hospital” have small incinerating facilities, which are not operating due to governmental closing order.

“Cabinda Central Hospital” owns a double chamber incinerator. At the time of the visit the referred facility was not operating due to financial shortage, concerning to fuel acquisition. However it was assured that the facility is able to operate in good conditions.

At “Agostinho Neto Central Hospital” there is a small incinerator. However it only operates at low temperatures and has problems with smoke elimination system.

In smaller HCE’s (Public Health Care Centers and Public Health Care Posts), waste is pit burnt outdoors.

Placentas are generally directed to common waste circuits, since they are placed together with the remaining waste at temporary storage level, except when the familiar ones take them home. Dirty clothes are taken to HCEs’ laundries or washed by patients’ families at home. Generalized infrastructures degradation and equipment lack within these laundries must be enhanced. Often, clothes are washed in tanks. Once reintroduced in the health care circuit, these clothes can cause different kinds of contamination to health care staff and patients.
Figure 26: Public dump at the back of an HCE

Figure 27: Pit burning of health care waste at the back of an HCE (Tchioco Health Care Post)

Figure 28: RECOLIX Incinerator Facilities

Figure 29: Incinerator in a HCE (Cabinda Central Hospital)
j) Liquid Waste

Liquid waste (blood, urine, etc.) is eliminated in restrooms and laboratory sinks, sent to sewers or to garbage bins with clinical analyses’ pipes.

l) Perception of health care waste related risks

At Managing/Administration level there is a misalignment between perception and reality regarding health care waste related risks. This could be justified by the long war period in the country.

At HCE’s level, health care personnel mostly has a notion of the risks, but lack of equipment and infrastructures is common. Facilities degradation, lead to a reduced sensitivity towards this issue. Awareness level on Health Care Waste related risks is very low among cleaning personnel and general population.
<table>
<thead>
<tr>
<th></th>
<th>Waste Segregated at the source</th>
<th>Collect equipment</th>
<th>Internal Transport</th>
<th>Temporary Storage</th>
<th>Disposal equipment</th>
<th>Sharps (needles) management</th>
<th>Birth Derivatives</th>
<th>Anatomic parts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Luanda Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Josina Machel Hospital</td>
<td>Only needles</td>
<td>Plastic bins with red and white plastic bags</td>
<td>Wheeled support trolley without a cover</td>
<td>In the back of the building within the HCE’s premises</td>
<td>No. Waste is collected by private company and municipal services (follows in this case the general waste circuit)</td>
<td>Use of inappropriate objects, namely water or sore bottles, juice packs, etc.</td>
<td>Sent to the same circuit of general waste</td>
<td>Buried In the municipal cemetery</td>
</tr>
<tr>
<td>Augusto N’Gangula Maternity</td>
<td>Only placentas And needles</td>
<td>Plastic buckets are washed after being unfilled into temporary storage containers; Cardboard boxes</td>
<td>No wheeled support</td>
<td>Waste collect private company’s plastic container in the patient’s waiting room Municipal collect container outside the HCE area</td>
<td>No. Waste is collected by private company and municipal services (follows in this case the general waste circuit)</td>
<td>Use of inappropriate objects, namely water or sore bottles, juice packs, etc.</td>
<td>Bagged and placed in private waste collect company’s containers</td>
<td>Directed to Américo Boavida Central Hospital</td>
</tr>
<tr>
<td>Américo Boavida Central Hospital</td>
<td>No segregation</td>
<td>Plastic buckets without bags; Cardboard boxes</td>
<td>No wheeled support</td>
<td>In the backs of the HCE (outdoors)</td>
<td>No. Incinerator is deactivated. Waste is collected by private company and municipal services (follows in this case the general waste circuit)</td>
<td>No</td>
<td>Sent to the same circuit of general waste</td>
<td>Buried In the municipal cemetery</td>
</tr>
<tr>
<td>David Bernardino Pediatric Hospital</td>
<td>Only needles</td>
<td>Plastic bins with and without bags</td>
<td>No wheeled support</td>
<td>Waste collection private company’s plastic container</td>
<td>No. Incinerator is deactivated. Waste is collected by private company and</td>
<td>Use of inappropriate objects, namely water or sore</td>
<td></td>
<td>Directed to Américo Boavida Central Hospital</td>
</tr>
<tr>
<td>Hospital</td>
<td>Segregation</td>
<td>Collection Containers</td>
<td>Wheeled Support</td>
<td>Waste Location</td>
<td>Waste Collecting Agency</td>
<td>Waste Disposal</td>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------</td>
<td>----------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------</td>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Prenda Hospital</td>
<td>No</td>
<td>Private company’s containers are in the corridors of the Health Care Establishment</td>
<td>No wheeled support</td>
<td>is placed in the patient’s waiting room / patio, when filled up</td>
<td>municipal services (follows in this case the general waste circuit)</td>
<td>bottles, juice packs, etc.</td>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>Kilamba-Kiaxi Hospital</td>
<td>Only needles</td>
<td>Plastic bins with and without bags</td>
<td>No wheeled support</td>
<td>In the backs of the health care unit (dump outdoors)</td>
<td>No. Waste is collected by municipal services (follows the general waste circuit)</td>
<td>No</td>
<td>Sent to the same circuit of general waste</td>
<td>Directed to Américo Boavida Central Hospital</td>
</tr>
<tr>
<td>Cajueiros Hospital</td>
<td>No</td>
<td>Plastic bins with and without bags</td>
<td>No wheeled support</td>
<td>Waste collect private company’s plastic containers are placed at the patio on collect days</td>
<td>No. Waste is collected by private company and municipal services (follows in this case the general waste circuit)</td>
<td>No</td>
<td>Sent to the same circuit of general waste</td>
<td></td>
</tr>
<tr>
<td>Angolodente Private Clinic</td>
<td>Only needles</td>
<td>Plastic and stainless steel buckets with bags</td>
<td>No wheeled support</td>
<td>Placed in the municipal collection container in the street behind the hospital</td>
<td>No. Waste is collected by municipal services (follows the general waste circuit)</td>
<td>Use of inappropriate objects, namely water or sore bottles, juice packs, etc.</td>
<td>Sent to the same circuit of general waste</td>
<td>Directed to Américo Boavida Central Hospital</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>---------------------------------------------</td>
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<td>---------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Sagrada Esperança Clinic</td>
<td>Waste that was in contact with patients is separated</td>
<td>Stainless steel buckets with bags</td>
<td>Wheeled support with cover</td>
<td>Sealed closed containers</td>
<td>Incinerator</td>
<td>Labeled rigid (puncture proof) containers. Sharps incineration</td>
<td>They are incinerated</td>
<td></td>
</tr>
<tr>
<td>Bongo Province :</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambriz Hospital</td>
<td>No segregation</td>
<td>Plastic bins without bag</td>
<td>No wheeled support</td>
<td>In the backs of the HCE (dump outdoors)</td>
<td>No</td>
<td>No</td>
<td>Sent to the same circuit of general waste</td>
<td></td>
</tr>
<tr>
<td>Catete Hospital</td>
<td>No segregation</td>
<td>Plastic bins without bag</td>
<td>No wheeled support</td>
<td>In the backs of HCE (dump outdoors)</td>
<td>No</td>
<td>No</td>
<td>Sent to the same circuit of general waste</td>
<td></td>
</tr>
<tr>
<td>Cabinda Province :</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabinda Central Hospital</td>
<td>Only needles</td>
<td>Hemotherapy service: Red bags for contaminated/hazardous waste and white bags for common waste Other services: plastic and cardboard boxes</td>
<td>No wheeled support</td>
<td>Unprotected Containers within the HCE and municipal Containers outside the HCE</td>
<td>Incinerator – interruptions in the operation caused by financial shortage concerning to fuel acquisition Hemotherapy Service: directs Waste to « CABINDA GULF » in order to be burnt</td>
<td>Hemotherapy: Labeled rigid (puncture proof) containers. Sharps incineration Other services: Use of inappropriate objects, namely water or sore</td>
<td>Incinerated with other contaminated waste, when the incinerator is operational</td>
<td>Buried In the municipal cemetery</td>
</tr>
</tbody>
</table>
### Angola’s National Health Care Waste Management Plan

<table>
<thead>
<tr>
<th>Location</th>
<th>Needles</th>
<th>Containers</th>
<th>Support</th>
<th>Usage Description</th>
<th>Disposal Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Military Hospital</strong></td>
<td>Only</td>
<td>Plastic bins, Municipal Containers outside the HCE</td>
<td>No wheeled support</td>
<td>Use of inappropriate objects, namely water or sore bottles, juice packs, etc.</td>
<td>Buried in the municipal cemetery</td>
</tr>
<tr>
<td><strong>Huíla Province:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Agostinho Neto Central Hospital</td>
<td>Only</td>
<td>Plastic bins without a bag, Cardboard boxes</td>
<td>No wheeled support</td>
<td>Incinerator working at low temperatures and municipal containers outside the HCE</td>
<td>Incinerated within the Health Care Establishment Buried in the municipal cemetery</td>
</tr>
<tr>
<td>Pioneiro Zeca Pediatric Hospital</td>
<td>Only</td>
<td>Plastic bins without a bag, Cardboard boxes</td>
<td>No wheeled support</td>
<td>Use of inappropriate objects, namely water or sore bottles, juice packs, etc.</td>
<td></td>
</tr>
<tr>
<td>Mitcha Health Center</td>
<td>No</td>
<td>Plastic bins without a bag, Cardboard boxes</td>
<td>No wheeled support</td>
<td>Sent to the same circuit of general waste</td>
<td></td>
</tr>
<tr>
<td>Tchioco Health Center</td>
<td>Only</td>
<td>Plastic buckets, Pit in the backs of the HCE</td>
<td>No wheeled support</td>
<td>Cardboard boxes provided by the UNICEF Those boxes are burnt afterwards, with the remaining waste</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Diagnostic Table of the visited HCE’s
3.2. Brief SWOT Analysis

An institutional process of analysis commonly used is SWOT method. Four (4) main vectors compose this method:
1. “STRENGTHS”- aspects which will allow establishing and consolidating the HCWM Plan.
2. “WEAKNESSES”- weaknesses related with the HCWM plan; should be eliminated or to reduced.
3. “OPPORTUNITIES”- these are external positive influences on HCWM; should be used and developed.
4. “THREATS”- should be deeply known in order to prevent their possible negative effects on the HCWM plan.

Selection of the aspects to be included within each of those four main vectors was performed as a sequence of: a survey elaborated and presented to HCE’s, several interviews and many meetings with elements of the Ministry of Health, Provincial Governments, Public and private HCEs, and other Angolan personalities. Those interviews and meetings occurred in the city of Luanda and Bengo, as well as in Cabinda, Lunda Norte and Huíla Provinces. Based on the information obtained within these Provinces, it is possible to infer for the whole country the following vectors:

3.2.1. Vector A - Strengths

- Awareness of the need to change;
- Predisposition of hospital heads/directors in order to create (and to participate in) teams that can assure an integrated HCWM;
- Strong interdependence between HCWM and General Waste Management;
- Predisposition for the development of cooperation agreements with other national and international entities;
- Increasing awareness regarding the necessity of staff participation in order to achieve the HCWM expected results;
- Increasing sensitivity in terms of professional development of personnel (agents who are related with the HCWM sector);
- Concern, among governmental entities, regarding to organization and implementation of a HCWM Plan;
- Enough assimilation and adaptation personnel capabilities, regarding the use of more appropriated technologies;
- Gradual implementation of HCWM related training courses within health care establishments, related with hygiene and public sanity;
- Availability of health care professionals and other staff for the HCWM sector at reasonable costs;
- Existence of some suitable incinerators;
- Existence of some projects for equipment and structures construction and rehabilitation;
- Awareness of the need to improve all the transport related logistic, as well as waste processing;

3.2.2. Vector B - Weaknesses

- Existing gaps in environmental policies;
- Existing gaps in waste management policies;
- Existing gaps at the level of environmental related legislation;
- Consequently, there are gaps in terms of HCWM legislation;
- Existing gaps in terms of Health Care Waste (related) statistics;
- Insufficient training plans regarding personnel responsible for HCWM and also for waste handlers;
- Low sensitization in terms of hygiene and waste treatment among entities, responsible people, staff and patients;
- In terms of searching for solutions within the HCWM sector, low level of motivation of the leaders was noticed. This low level of motivation is caused mainly by structures’ degradation and financial difficulties;
- Health Care Establishments’ budgets are generally reduced. For that reason, funds are primarily directed to other areas. Health care waste related investments and inherent expenditures remain in a second level of importance;
- Needs of HCWM related equipment, namely equipment related with waste separation, transport, storage and disposal;
- The majority of visited health care establishments do not possess adequate equipment for collecting sharps and (other) contaminated waste;
- Frequently, health care establishments do not possess adequate structures, neither for practicing medicine, in general terms, nor to waste management, in particular;
- Deficiencies regarding both general and hazardous waste collection (performed by companies exterior to HCE’s);
- Landfills are insufficient; there are two diverse situations depending on the Provinces. In Luanda Province there is a landfill, insufficient though; in the remaining Provinces there isn’t any landfill;
- Waste incineration is also diverse. In Luanda Province exists a new operational incinerating facility. However, this facility faces financial and accessibility problems. In some of the remaining Provinces, there are incinerating structures close to the main hospitals, but mostly they are not operative due to financial difficulties (fuel acquisition and maintenance cannot be assured). In some other Provinces there are no incinerating structures.
- Non-existence of dynamic companies in the HCWM sector, namely at Provincial level;
- Absence of long-term strategic plans;
- Deficient management systems;
- Reduced information on generated waste quantification, evolution trends, and respective use;
- Deficient definition of organizational structures;
- Non-existence of specialized services promoting prevention of labor related risks, and occupational security and hygiene;
- Scarcity of national public aids and international supports for personnel training and sensitizing general population;
- Low technological level, specially at provincial level, where it is notorious an insufficient degree of modernization;
- Lack of adequate structures;
- Low use of the installed available capacity;
- Deficient processes’ organization;
- Scarce waste treatment;
- Low development in terms of support activities;
- Low level of cooperation between HCE’s and other entities related with waste management;
- Difficulty in developing consistent investment projects.

3.2.3. Vector C - Opportunities

- Angolan Economy is clearly developing;
- Government is investing in several kinds of infrastructure;
- This is a phase of great investments in the public health sector;
- There is more private investment on the health care sector;
- International public opinion is favorable to Angolan economical options;
- Participation of the country in international development platforms;
- Support by international financial institutions as the International Monetary Fund and the World Bank;
- Interest of national and international private investors;
- Existence in Angola of a considerable amount of projects in different kinds of activities;
- Existence in Angola of a high number of non-governmental organizations working within the health care sector;
- Commitment of the most representative Angolan institutions in order to participate in this project;
- Increasing capability of relationship and establishment of partnerships with the private sector;
- Social and political stability.

3.2.4. Vector D - Threats

- Significant delays in terms of investments on infrastructures namely in health and accessibility infrastructures;
- Social and labor instability;
- Delay in education development;
- Scarcity of highly skilled technicians within the health care sector;
- Difficulty of implementing the project in the most remote municipalities due to lack of communications;
- Change of international opinion towards the Angolan development process;
- Qualified technicians abandon the country;

3.2.5. Crossed analysis

Potentialities (internal potential/strengths to preserve, crossed with external opportunities):

- Responsible entities are conscious on the HCWM issue allied with Governmental international institutions’ commitment in order to invest in infrastructures and in health care system;
- Human resources with assimilation capability regarding to new technologies and new fields of knowledge, supported by ONG’s existing in Angola and financed by international institutions, favor the execution of the HCWM Plan in Angola;
- The existence of some incinerating facilities and (in some cases) the availability of structures (with rehabilitation needs, though) allied to current investment increase phase (by both the government and financing international entities). These aspects allow the existence of a positive frame, in terms of technological conditions, on a short-term.

Constraints (internal weaknesses to be reduced/eliminated, crossed with external chances that can be wasted):

- Existing gaps in terms of legal aspects and also in terms of HCWM can compromise the results of investments in infrastructures (either by the Government or by financing international entities);
- The vast country’s dimension and difficulties regarding road transport are a constraint in terms of investment by national and international private investors, in this sector;
- Reduced cooperation among health care establishments is not adjusted to international institutions standards, namely the World Bank financing models.
Vulnerabilities (internal forces crossed with external threats):

- Consciousness on the necessity of change and structural global interventions within the HCWM. This consciousness exists among responsible entities and employees. However, it could possibly not be enough to face some project implementation related difficulties. These difficulties are related to aspects like remoteness of some HCE’s and to scarcity of properly trained/qualified professionals;
- Although within the HCE’s some predisposition exists for the development of cooperation agreements, and in spite of the governmental concern regarding to HCWM, a deficient preparation or implementation of a plan within this sector could lead to a change in terms of international public opinion in regard to in the development process in Angola.

Problems (external threats crossed with internal weaknesses):

- A change of international public opinion regarding the development process of Angola in conjunction with the current state of infrastructure and lack of equipment constitutes a serious problem in terms of intervention within this sector;
- Another important problem is the conjunction of lack of suitable legislation, with the non-existence of HCWM Plans, and qualified technicians scarcity;
- Deficient sensitization and awareness (on the HCWM subject) of health care personnel and general population in conjunction with delays in both human and material/structural investments. This conjugation makes difficult the attainment of solutions on a short and medium term.

3.2.6. Conclusion

Taking into account analysis performed within the crossed analysis point, some critical factors should be mentioned. Those factors are considered decisive for the success of any plan in terms of the HCWM sector.

ORGANIZATION and MANAGEMENT

- Necessity of an adequate management at all levels, including integrated management plans, namely:
  - Health Care Waste strategic management at central, provincial and on-site (within the HCEs) levels;
  - Organization and management of the whole process related with collect, storage and disposal practices as well as inherent activities;
  - Transport related logistics organization and management;
  - Incinerating facilities and landfills’ organization and management;
- Necessity to find joint solutions for common problems;
- Creation of synergies between (the) HCEs and entities managing incinerators and landfills.

HUMAN RESOURCES

- Necessity to sensitize and train health care personnel so that they become more qualified and in order to promote permanent motivation at all levels.

POLICIES, LEGISLATION and REGULATION

- Definition of environmental policies including the HCWM subject;
• Elaboration of adequate environmental legislation in compliance with international environmental rules;
• Elaboration of specific regulations with regard to health care waste.

SENSITIZATION and TRAINING

• Any intervention in terms of HCWM requires the involvement of all implicated agents; for this reason, sensitizing all of them is crucial and urgent;
• Developing broad sensitization programs, directed to agents intervening within the health care system and general population. These programs should be performed in order to raise awareness on the necessity of hygiene and health care waste treatment. Sensitization must be performed both on health care waste and hygiene topics, for it is very difficult to alert all the involved agents - entities, heads and managers, other personnel and patients - for HCWM issue, in degraded health care establishments, with a deficient hygienic situation;
• It is to enhance the possible complexity of the sensitization and training aspects, for these items are related with mentalities’ change, which is usually a very slow process;

FINANCING AND INVESTMENT QUESTIONS

• Health care establishments must have budgets to assure the performance of HCWM activities;
• Investment plans in terms of health care infrastructures are required in order to promote hygiene and to improve health care waste treatment within HCE’s;
• Developing programs for the attainment of national and international public aids for organizing and managing, sensitizing and training and infrastructure construction and rehabilitation.
### 3.3 Health Care Waste Generation in Angola (Estimate)

<table>
<thead>
<tr>
<th>Province</th>
<th>Hospitals</th>
<th>Nr.</th>
<th>B/H</th>
<th>Occupied beds</th>
<th>Gener./day (kg)</th>
<th>Gener./Year (kg)</th>
<th>Nr.</th>
<th>Gener./day (kg)</th>
<th>Gener./Year (kg)</th>
<th>Nr.</th>
<th>Gener./day (kg)</th>
<th>Gener./Year (kg)</th>
<th>ANNUAL (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengo</td>
<td>5</td>
<td>50</td>
<td>188</td>
<td>113</td>
<td>41,063</td>
<td>1,241,372</td>
<td>2</td>
<td>36</td>
<td>13,140</td>
<td>30</td>
<td>150</td>
<td>54,750</td>
<td>108,953</td>
</tr>
<tr>
<td>Benguela</td>
<td>10</td>
<td>167</td>
<td>1,253</td>
<td>752</td>
<td>274,462</td>
<td>4,127,155</td>
<td>25</td>
<td>450</td>
<td>164,250</td>
<td>65</td>
<td>325</td>
<td>118,625</td>
<td>557,337</td>
</tr>
<tr>
<td>Bié</td>
<td>4</td>
<td>180</td>
<td>539</td>
<td>323</td>
<td>117,932</td>
<td>3,713,274</td>
<td>7</td>
<td>126</td>
<td>45,590</td>
<td>35</td>
<td>175</td>
<td>63,875</td>
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<tr>
<td>Cabinda</td>
<td>4</td>
<td>120</td>
<td>361</td>
<td>216</td>
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<td>2,109,047</td>
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<td>198</td>
<td>72,270</td>
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<td>Huambo</td>
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<td>4,626,532</td>
<td>21</td>
<td>378</td>
<td>137,970</td>
<td>99</td>
<td>495</td>
<td>180,675</td>
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</tr>
<tr>
<td>Kwanza Kab.</td>
<td>8</td>
<td>121</td>
<td>727</td>
<td>436</td>
<td>159,158</td>
<td>5,165,806</td>
<td>4</td>
<td>72</td>
<td>26,280</td>
<td>15</td>
<td>75</td>
<td>27,375</td>
<td>212,813</td>
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<tr>
<td>Kwanza N.</td>
<td>2</td>
<td>78</td>
<td>117</td>
<td>70</td>
<td>23,623</td>
<td>715,606</td>
<td>12</td>
<td>216</td>
<td>78,840</td>
<td>27</td>
<td>135</td>
<td>49,275</td>
<td>153,738</td>
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<tr>
<td>Kwanza Sul</td>
<td>5</td>
<td>100</td>
<td>376</td>
<td>225</td>
<td>82,289</td>
<td>2,619,401</td>
<td>18</td>
<td>324</td>
<td>118,260</td>
<td>108</td>
<td>540</td>
<td>197,100</td>
<td>397,649</td>
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<tr>
<td>Kunene</td>
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<td>147</td>
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<td>132</td>
<td>48,290</td>
<td>1,415,800</td>
<td>8</td>
<td>144</td>
<td>52,560</td>
<td>52</td>
<td>260</td>
<td>94,900</td>
<td>195,750</td>
</tr>
<tr>
<td>Luanda</td>
<td>12</td>
<td>216</td>
<td>1,946</td>
<td>1,167</td>
<td>426,065</td>
<td>1,4,467,893</td>
<td>34</td>
<td>612</td>
<td>223,380</td>
<td>13</td>
<td>65</td>
<td>23,725</td>
<td>673,170</td>
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<tr>
<td>Lunda Norte</td>
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<td>148</td>
<td>556</td>
<td>333</td>
<td>121,709</td>
<td>3,7,537,339</td>
<td>5</td>
<td>90</td>
<td>32,850</td>
<td>12</td>
<td>60</td>
<td>21,900</td>
<td>176,459</td>
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<td>Lunda Sul</td>
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<td>144</td>
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<td>31,536</td>
<td>976,139</td>
<td>3</td>
<td>54</td>
<td>19,710</td>
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<td>160</td>
<td>58,400</td>
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<td>1,147,334</td>
<td>14</td>
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<td>91,980</td>
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<td>264,625</td>
<td>425,426</td>
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<tr>
<td>Namibe</td>
<td>2</td>
<td>177</td>
<td>266</td>
<td>159</td>
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<td>1,147,334</td>
<td>6</td>
<td>108</td>
<td>39,420</td>
<td>33</td>
<td>165</td>
<td>60,225</td>
<td>157,790</td>
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<tr>
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<td>708</td>
<td>425</td>
<td>155,052</td>
<td>4,737,249</td>
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<td>342</td>
<td>124,830</td>
<td>55</td>
<td>275</td>
<td>100,375</td>
<td>380,257</td>
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<tr>
<td>Zaire</td>
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<td>192</td>
<td>115</td>
<td>42,048</td>
<td>1,369,208</td>
<td>6</td>
<td>108</td>
<td>39,420</td>
<td>32</td>
<td>160</td>
<td>58,400</td>
<td>139,868</td>
</tr>
</tbody>
</table>

**Notes:**

- Health care waste (HCW) generation for Hospital is estimated in = 0.6 kg/bed/day
- Health care waste (HCW) generation for Health Center is estimated in = 18 Kg/day
- Health care waste (HCW) generation for Health Care Post is estimated in = 5 Kg/day
- Average hospital bed occupation rate is estimated in = 75%
- In cases of lack of information on number of beds in hospitals it is considered the number of 50 beds
- Estimate of the total infected HCW rate in Angola (between 20 and 30%) = 25%
- Estimate of the total sharps rate in Angola (between 2 and 5%) = 3%
- B/H is the number of beds for Hospital in each province

Source about beds and HCE numbers: Ministry of Health
4. IMPLEMENTING STRATEGY OF THE HCWM PLAN

4.1. STRATEGIC VECTOR 1: Reinforce institutional, legislative and regulation frame

4.1.1 Introduction

In order to be efficiently performed, any activities concerning environment, hygiene and waste, particularly within health care establishments, demand a legislative frame in order to rule interventions at central and provincial levels. This frame allows political involvement and execution plans definition, disciplines interventions in Health Care Establishments (HCE) and sends alerts to population. It also foments national cohesion and support, so that leaders and agents can develop activities in order to minimize health care waste related effects on the community.

4.1.2. International Agreements, Legislation and Related Principles

International agreement has been reached on a number of underlying principles that govern either public health or safe management of hazardous waste. These principles outlined below should be taken into consideration when national legislation or regulations governing healthcare waste management are formulated:

- The “Basel Convention” signed by more than 100 countries, concerns transboundary movements of hazardous waste; it is also applicable to health-care waste. Countries that signed the Convention accepted the principle that the only legitimate transboundary shipments of hazardous waste are exports from countries that lack the facilities or expertise to dispose safely of certain wastes to other countries that have both facilities and expertise. Exported waste should be labelled according to international standards.
- The “Polluter Pays Principle” implies that all producers of waste are legally and financially responsible for the safe and environmentally sound disposal of the waste they produce. This principle also attempts to assign liability to the party that causes damage.
- The “Precautionary Principle” is a key principle governing health and safety protection. When the magnitude of a particular risk is uncertain, it should be assumed that this risk is significant, and measures to protect health and safety should be designed accordingly.
- The “Duty of Care Principle” stipulates that any person handling or managing hazardous substances or related equipment is ethically responsible for using the utmost care in that task.
- The “Proximity Principle” recommends that treatment and disposal of hazardous waste take place at the closest possible location to its source in order to minimize the risks involved in its transport. According to a similar principle, any community should recycle or dispose of the waste it produces, inside its own territorial limits.

4.1.3. Legal Provisions

National legislation should be the departure point regarding improving and or implementing HCWM related practices. Legislation establishes legal controls and licenses, so that the responsible entity (which usually is the Health Ministry) can assume the referred implementation. The Ministry of Environment or the national entity for environmental protection should also be involved; before legislative issue happens, clear designation of responsibilities should occur before the law is enacted.
The law should be complemented by a policy document, and by technical guidelines developed for implementation of the law. This legal “package”:
- should specify regulations on treatment for different waste categories, segregation, collection, storage, handling, disposal, and transport of waste;
- should give specifications about responsibilities, and training requirements;
- it should take into account the resources and facilities available in the country;
- and should have in account any cultural aspects of waste-handling.

A National Law on health-care waste management may stand alone or may be part of more comprehensive legislation such as the following:
- Law on management of hazardous wastes (application to health-care waste should be explicitly stated);
- Law on hospital hygiene and infection control (a specific chapter or article should be devoted to health-care waste).

The National Law should include the following:
- a clear definition of hazardous health-care waste and of its various categories;
- a precise indication of the legal obligations of the health-care waste producer regarding safe handling and disposal;
- specifications for record-keeping and reporting;
- specifications for an inspection system to ensure enforcement of the law, and for penalties to be imposed for contravention;
- designation of courts responsible for handling disputes arising from enforcement of or non-compliance with the law.

In addition, HCE’s should be managed, and health-care waste disposed of, in accordance with all other relevant national legislation, such as regulations pertaining to:
- Waste in general;
- Effects on Public Health and the Environment;
- Air Quality;
- Prevention and control of Infectious Diseases;
- Management of radioactive materials.

### 4.1.4. Policy Documents and Technical Guidelines

Policy document should mention national objectives and key steps in order to achieve those objectives. It should comprise, at least, the following items:
- Enumeration and description of health and safety risks associated with health care waste;
- Reasons for correct and safe HCWM practices to be performed;
- List of approved methodologies of treatment and disposal regarding each particular waste category;
- Alerts on dangerous practices, like hazardous waste disposal on municipal landfills;
- Management responsibilities within health care establishments, as well as responsibilities outside those establishments;
- Evaluation of HCWM related costs;
- Legislative and Regulatory issues;
- Key operations within HCWM (waste minimization, segregation, identification, handling, treatment and disposal); all the technical specifications concerning each specific operation should be described on specific and separated technical guides;
- Keeping records and documents;
- Training needs;
- Rules Respecting health care personnel protection.
Technical Guidelines associated to legislation should be practical and directly applicable. These should include the following specifications:

- Legal framework concerning: safe HCWM, hospital hygiene, occupational health and safety (may be addressed here air pollution emissions limits or water resources protective legislation);
- Waste minimization practices;
- Waste segregation, handling, storage and transport practices;
- Recommended treatment and disposal methods regarding different health care wastes categories.

“Health care waste” concept definition and discrimination into its’ different categories should be included, not only within the National Law on HCWM, but also in Technical Guidelines.

A progressive application of the law is recommended, instead of an attempt to simultaneously introduce all the measures, particularly where it is not easy to implement those practices.

This first strategic vector consists exactly on the creation of a modern and efficient legal frame, adapted to the country’s characteristics and catalyst of practical actions. Moreover, it should mobilize public opinion.

4.1.5. Foreseen Actions

- Constitution of a team on a national level in order to prepare/elaborate legislation (and regulations);
- Preparation / elaboration of that legislation;
- Legislation / regulations approval.

4.2. STRATEGIC VECTOR 2: Planning and Managing

4.2.1. Introduction

Activities like assessing and using information, planning and managing, perform very important roles, in order to increase the quality of the services performed, to increase productivity and regarding the improvement of results in terms of health care waste impact on populations.

Management improved at all levels, from central national services to the smallest health care establishment within a remote location in the province, is very important, in order to achieve the results expected within the Health Care Waste Management plan.

4.2.2. HCWM Plan Implementation phases

This strategic vector consists indeed in the provision of conditions leading to better quality in the organization and management of health care services.

For that purpose some major steps can be enumerated in order to perform development and implementation of the Health Care Waste Management Plan:

a) Nomination of a responsible person who will assume the responsibility for the plan (on a national level) and formation of teams on national, provincial and on-site (within each health care establishment) levels:
After governmental decision of implementing a Health Care Waste Management plan, the Ministry of Health should nominate a national official to be in charge of planning and implementing a health care waste management system.

This director will be responsible for the operation and monitoring of the health care waste management system on a national level and will act with delegated authority regarding law enforcement (meanwhile, laws and regulations should have been approved). Knowledge of the country, of health care system, of technical requirements on waste treatment and pro-active attitude and motivation are essential characteristics of such position, in order to improve practices related to health care waste, infection control and hygiene.

The dimension of the health care establishment should determine the composition teams that will assure on a local level implementation of measures related to health care waste management. That way, for major hospitals (“general” and “central” hospitals) it is suggested that the team should be composed by the following elements: head of the hospital, directors of some medical departments, pharmaceutical officer, matron of the hospital; infection control officer; maintenance responsible engineer; cleaning and housekeeping responsible; HCWM officer (to be nominated) and financial director. In smaller health care establishments, it is suggested that the infection control officer should be in charge of health care waste planning (and implementation).

b) Assessment/diagnostic (through a survey) on current Health Care Waste Management situation:

A survey should be done in order to assess the current situation regarding HCWM in each HCE, and to identify difficulties and needs. The HCWM national officer or local officer, in close cooperation with the team within each HCE, will be the responsible for the survey and for the analysis of its results. This survey works as a stand to identify improvement opportunities regarding waste collection, storage, handling and disposal. This survey should consider the following issues:

i. waste composition;
ii. waste quantity;
iii. sources of waste generation;
iv. and number of beds.

The results of the survey should be presented in terms of: daily average waste generation (Kg – kilograms) in each HCE by category and by department.

Estimates should keep in mind epidemics that frequently occurred in the past and other emergencies affecting the quantity of generated waste. Estimates should be aware of the occurrence of prior epidemics or other emergencies that may affect waste generation.

The survey should also gather other kinds of information like:

- General information: kind of waste generated within the HCE, number of medical departments, number of beds, occupation rates, among others;
- Treatment and disposal equipment and facilities inventory, and respective capacities and efficiency;
- Analysis on current HCWM practices, namely in terms of segregation, storage, collect, transport, treatment and disposal;
- Information on existing equipment, namely containers, trolleys and other equipment used for waste collection, handling and transport;
- Information on the responsibilities and roles of the personnel involved in infection control and HCWM, as well as their qualifications;
- Assessment on of HCWM related costs;
- Assessment on the existence of a color code for containers and trolleys;
- Evaluation of the current level of safety (regarding topics like the use of protective clothing) as well as safety measures (like in case of spills or chemical accidents);
- Analyzing the emergency response capability (like special measures for managing large quantities of health care waste in case of epidemics like cholera or hemorrhagic fevers);
- Establishment of a training /awareness raising program on this subject;
- Analysis on procedures regarding possible breakdown or planned maintenance of health care waste treatment equipment;
- Gathering/establishing layouts/drawings/sketches representing: HCE and medical departments, health care waste treatment and disposal equipment and their locations, health care waste storage equipment and their locations, Paths of the trolleys through the HCE, Safety equipment, Location of patient’s rooms, Location of equipment for disinfecting and sterilization of medical reusable utensils medical equipment, Trolleys and containers washing and disinfecting areas, Accesses To the HCE;
- Prepare drawings / sketches and specifications of containers (for hazardous health care waste, sharps, and others), trolleys, plastic bags (thickness, length, width) and protective clothing to be used during handling each category of waste (like gloves, masks, plastic aprons, boots and eye protection, etc.).

c) Recommend improvements of HCWM in each HCE and prepare a set of arrangements for its implementation:

Recommendations must relate personnel roles and responsibilities, human and material resources (equipment and structures) and training needs. They should aim to achieve a minimum level of protection against health care related risks. For that purpose it is required to:
- Determine the amount and composition of waste generation;
- Analysis of local options (in HCE) regarding waste handling, treatment and disposal;
- Waste segregation into hazardous and general waste (the latter to be sent to municipal landfills);
- Assure personnel training, as well as safety within the workplace (for example, safe use of chemicals for waste disinfection);
- Assignment of responsibilities within health care establishments;
- Establishment of internal rules for waste handling (for items like storage using color coding or signal coding, filling, sealing and labeling of bags/containers);
- Choice of the most appropriate treatment and disposal options.

In the first place, HCE’s should focus on safe practices and procedures in terms of health care waste segregation and, internal waste collect and storage, measures which have important impacts reducing consequences of poor hygiene practices. Improvements within in these fields should include the following topics:
1. Segregation
   - Waste segregation into three categories (general waste, health care hazardous waste and sharps);
   - Use of posters and checklists in order to assist waste segregation;
   - Use of a color coding system in bags/containers or (if not feasible) clear labeling of bags/containers in order to discriminate waste categories;
   - Use of labeling for closed yellow bagged waste;
   - Existence of safety procedures (protective clothing, etc.) and emergency response (for example, in case of injuries by sharps;
   - Awareness raising and practical training within the workplace.
2. Storage
   - Keeping containers and temporary storage areas away from patients’ areas;
   - Separate temporary storage areas and containers for hazardous waste and general waste;
   - Establishment of a schedule for collection and transport of bagged waste;
   - Periodical cleaning and disinfecting of temporary storage areas and containers.
3. Internal transportation
   • Use of color coding in the trolleys and wheeled containers or (if not feasible) use of colored signs on the trolleys/wheeled containers in order to differentiate between those reserved to general waste and the ones reserved for hazardous waste.
   • Leak/puncture proof trolleys and wheeled containers (with cover) for hazardous waste collect and transport;
   • Existence of safety measures (like protective clothing) and emergency response in case of spills or occupational injuries;
   • Awareness raising and practical training within the workplace.

A work plan containing practical information on improvements in each medical department should be developed. That plan should include some topics, namely:
   • Checklists containing steps for safe segregation of health care waste categories, methods for sterilization of reusable utensils, etc.;
   • Processes to be performed and scheduling HCWM-related improvements, regarding activities like segregation, handling and collection, transport and treatment, as well as definition of responsibilities;
   • Training and awareness-raising measures in order to introduce procedures for implementation of planned activities; those measures should be performed using supports like posters, leaflets, training guides, visits and training.

The work plan should:
   i. Alert on health risks from waste mishandling;
   ii. Provide detailed information on safety practices and emergency response in case of incident /accidents related with HCW;
   iii. Suggest measures/procedures to control implementation of HCWM related improvements;
   iv. Define performance standards and performance indicators to evaluate the improvements’ effectiveness;
   v. Propose contingency specific measures, including instructions on health care waste storage in case of breakdown of the HCW treatment units or during close down for planned maintenance.

d) Approve the health care waste management plan and start its implementation

The HCWM Plan should be discussed by the HCWM teams and submitted to approval by the head of the health care establishment. In case it is approved, the plan’s implementation is, from that moment on, a responsibility of the head of the HCE.

e) Keep up with (monitor and control) the plan’s implementation and review it periodically.

For purposes of long term efficiency, the plan should be reviewed periodically (for example every two years) Promoted by the national officer, these revisions should count on the cooperation of: HCWM teams working within the implementation of those plans (in major hospitals), the head of the smaller HCE’s, people responsible for environmental issues within the municipalities, landfills managers, ONG’s and HCWM related companies.
As a summary:

HCE’s generating health care waste should establish a system based on the most appropriate resources in order to achieve a safe and environmental friendly HCWM. This system should start with basic measures and be progressively improved. First steps comprehend the following items regarding health care waste: segregation, safe handling, treatment and disposal.

Some important activities to be performed are:
- Allocation of human and financial resources;
- Waste minimization, including buying policies and stocks management practices;
- Assignment of responsibilities regarding waste management;
- Waste segregation into general and hazardous health care waste and implementation of correct procedures in terms of health care waste: safe handling, storage, transport, treatment and disposal;
- Monitoring health care waste generation and its destination.

4.2.3. Foreseen actions

This objective will be performed through the following measures:

- National project starting conference with the participation of entities directly related with the HCWM sector, public and private, on central and provincial levels.
- Annual National Seminar for evaluating solutions developed in each HCE and for presentation of new proposals for improvement of the HCWM plan, with the participation of entities directly related with the HCWM sector, public and private, on central and provincial levels.
- Project of technical assistance to the Ministry of Health in order to prepare and organize the HCWM plan.
- Support to HCE’s regarding the elaboration of annual budgets including HCWM related expenses.
- Inspection, assessment and evaluation of the HCWM plan implementation.
- Support regarding collecting, processing and saving statistic data obtained in the HCE’s.

4.3. STRATEGIC VECTOR 3: Installing and equipping

4.3.1 Introduction

In order to develop activities to consolidate a HCWM Plan practical conditions are mandatory. These conditions should constitute the best possible background for waste collect, treatment, transport and disposal. Without appropriate structures and equipment no HCWM related interventions are possible within the HCE’s.

This third strategic vector consists on the analysis of the available technologies and the presentation of suitable suggestions (adjusted for each case) with regard to equipment acquisition and structures construction or rehabilitation, in order to provide the country with better health care waste treatment and disposal conditions.

4.3.2 Collect, transport and temporary storage

Source segregation is the key of a HCWM plan success. For that reason, HCE’s should be provided with collect equipment for contaminated or potentially contaminated waste, sharps, radioactive waste and general waste. That way, a four distinct (easily identifiable) containers / bags system should be adopted, using a color code or appropriate symbols.
<table>
<thead>
<tr>
<th>WASTE TYPE</th>
<th>CONTAINER TYPE</th>
<th>COLORS</th>
<th>SIMBOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL WASTE</td>
<td>Bag</td>
<td>Black</td>
<td>----------</td>
</tr>
<tr>
<td>CONTAMINATED OR POTENTIALLY</td>
<td>Bag</td>
<td>Yellow</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td>CONTAMINATED WASTE</td>
<td>Rigrid Container, Sharp/Puncture proof,</td>
<td>Yellow</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td>SHARPS</td>
<td>able to contain liquids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RADIATIVE WASTE</td>
<td>Rigid Container, Sharp/Puncture proof,</td>
<td>Red</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td></td>
<td>able to contain liquids</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 - symbols and color code

![Diagram of protective clothing](image)

Figure 32: Individual protective clothing required for waste handling by cleaning personnel and sweepers

The transport of conditioned wastes will be done at specific hours through using wheeled supports. Waste handlers will be provided with individual protective clothing.

In each hospital department a specific location should be provided for an adequate temporary storage. Health care posts and other basic HCE’s should perform the same measure. Temporary storage location must only be accessible to staff assigned for health care waste handling.

Health care waste must be placed in rigid containers with large capacity and the same color code and symbol used in the collection equipment, so that segregation is maintained.

4.3.3. Disposal

4.3.3.1 Comparative table of available technologies
Waste treatment and disposal technologies are nowadays much diversified. In the following table a comparative analysis of the diverse available technologies can be found.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary kiln</td>
<td>Rotating oven with a post-combustion chamber assuring an incineration between 1,200 and 1,600ºC.</td>
<td>Suitable for all infectious and pharmaceutical waste</td>
<td>High investment and high operation costs</td>
</tr>
<tr>
<td>Pyrolytic incineration</td>
<td>Double chamber at medium-temperature combustion process (800-900ºC), producing solid ashes and gases.</td>
<td>Very high disinfecting efficiency. Drastic reduction of waste volume Adequate for all infectious waste and most pharmaceutical and chemical waste the types of residues. Waste is not identifiable after the treatment. Possibility of heat recovery</td>
<td>Incomplete destruction of cytotoxic waste High Costs of investment /operation Formation of dioxins High costs of maintenance, control and repairing)</td>
</tr>
<tr>
<td>Chemical disinfecting</td>
<td>Addition of chemicals to waste to kill or inactivate the pathogens through a shredding process before the treatment</td>
<td>High disinfecting efficiency under good operating conditions. Good reduction in waste volume</td>
<td>Requires highly skilled technicians for operation and maintenance. Use of hazardous chemicals. Inappropriate for pharmaceutical, chemical and some types of infectious waste</td>
</tr>
<tr>
<td>Autoclave</td>
<td>Wet thermal disinfecting based in the exposure of shredded infectious waste to high temperatures (121ºC minimum), high-pressure steam(up to 6 bars)</td>
<td>Environmentally sound Reduction in waste volume. Investment and costs of operating costs relatively reduced</td>
<td>Shredders are subject to frequent breakdowns, poor functioning. Operation requires qualified technicians. Inadequate for pharmaceutical, chemical and anatomic waste</td>
</tr>
<tr>
<td>Microwave irradiation</td>
<td>Application of microwave radiation at a frequency of 2,450 MHz, rapidly heating the water contained in the waste and destroying infectious waste by heat combustion</td>
<td>Environmentally sound Good disinfecting efficiency of under good operating conditions. Good reduction in the waste volume</td>
<td>High investments and operations costs. Potential operational and maintenance problems. Shredders are subject to frequent breakdowns, and poor functioning.</td>
</tr>
<tr>
<td>Single-chamber incineration</td>
<td>Incineration at low temperature (300-400ºC) in simple incinerator</td>
<td>Good disinfecting efficiency. Drastic waste volume weight reduction. No need of qualified operators.</td>
<td>Significant emission of atmospheric pollutants inefficiency in the destruction of thermally resistant chemicals and drugs</td>
</tr>
<tr>
<td>Drum incinerator</td>
<td>The simplest form of single chamber incinerator</td>
<td>Reduction of waste weight and volume. Very low investment and operating costs</td>
<td>Massive emissions of de black smoke, fly ash and toxic flue gas. Odorous. Destroys only 99% of microorganisms.</td>
</tr>
</tbody>
</table>
4.3.3.2 Analysis of Technological and Management Scenarios

Considering Angolan social and economic context and concerning the urgency a HCWM intervention, the choice of disposal technologies must be “radical”, eliminating health care waste related risks as well as responding to the highest sustainability criteria possible with reasonable maintenance and investment costs.

The uses of technologies as oven, rotating drum, chemical disinfecting, autoclave, or microwave radiation are considered inadequate due the high investment costs or the specificity of maintenance requirements. Waste inertization and encapsulation are not considered suitable for not being radical technologies in terms of waste related risks elimination.

Thus, incineration followed by ashes safe burial is considered the most suitable solution for waste disposal.

With respect to incineration, three distinct technologies can be considered: single chamber incineration (Montfort type incinerator), drum incinerator and pyrolytic incineration (double chamber incineration). These technologies, with different environmental consequences, have distinct investment and maintenance costs. For that reason, they must be wisely used.

<table>
<thead>
<tr>
<th>Option</th>
<th>Option description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>Use of other technological processes</td>
<td>High sustainability criteria,</td>
<td>Not radical In terms of waste disposal or with high investment and maintenance costs</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>Use of double chamber incinerator (with big capacity) for each province close to the HCE in which with the largest waste generation occurs Waste from other HCE’s would be transported to the incinerator</td>
<td>Less investment; closer and easier management. Reduced number of atmospheric Pollutant sources</td>
<td>Deficient road Structures Health risks associated with transport High transportation costs Atmospheric Pollution is higher next to the HCE with in which the largest waste generation occurs</td>
</tr>
</tbody>
</table>
Scenario 3
Use of a larger number of double chamber incinerators in all provinces. Still, waste transport from some health care posts will be necessary
Less complex management; Reduced number of atmospheric pollutant sources
Higher investment and maintenance costs
More investment is required; Deficient road structures
Health risks associated with transport
High transportation costs

Scenario 4
Use of double chamber incinerator (with big capacity) for each province (In Luanda and Cabinda use of the existing incinerators) Use of simple and low cost incinerators close to Small HCE’s
Less investment
Waste transportation is not necessary
Ease in terms of ashes’ safe burial
Ease in terms of use and maintenance
More complex management
Bigger number of atmospheric pollutant sources
Use of more pollutant technologies in small HCE’s

Table 11: Advantages and Disadvantages of the Diverse Technological Scenarios

<table>
<thead>
<tr>
<th>Option</th>
<th>Juridical nature</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private joint administration</td>
<td>Partnership HCE’s/ Municipalities Company managed by a society to be constituted</td>
<td>Development of partnerships between the HCE’s Private administration Job Creation Creation of waste flow related matrices</td>
<td>Waste is transport outside HCE’s Difficulty of application of the institutional aspects</td>
</tr>
<tr>
<td>Municipal management</td>
<td>Partnership Municipalities/H CE’s</td>
<td>Reduced costs for HCE’s; Experience in waste management Job Creation;</td>
<td>Waste is transport outside HCE’s, and possibly together with general waste There is no creation of waste flow related matrices Less efficient management</td>
</tr>
<tr>
<td>Integral private Management</td>
<td>Partnership HCE’s/ Municipalities/ Company Management to be performed by the company</td>
<td>Centralized waste disposal More efficient Management; Job Creation; Ease to rescind de contract;</td>
<td>More costs to HCE’s Waste is transport outside HCE’s</td>
</tr>
<tr>
<td>Internal Management</td>
<td>Management performed By the HCE</td>
<td>Waste is not transported outside HCE’s Rigorous waste Management by HCE’s heads / authorities Creation of waste flow related matrices</td>
<td>Very high investment to the HCE’s Multiplication of incinerating sources</td>
</tr>
</tbody>
</table>

Table 12: Advantages and Disadvantages of the Diverse Management Scenarios

4.3.3.3. Suggested solutions

The best solution for HCWM requires the installation and use of environmentally sustainable technologies and equipment. However, taking into account the Angolan social and economic context and the need of an improvement in the HCW sector, and the necessity of controlling transmissible diseases as HIV/AIDS and tuberculosis it is suggested that improvements in terms of HCWM should be performed in two phases: (1) In a short/medium term the solution should include the installation of medium/large dimension incinerating facilities in the province capitals and the installation of small dimension incinerating facilities next to the HCE’s in the municipalities; (2) in a medium/long term, with more adequate solutions in environmental
terms, including a more selective collect, followed by sterilization, decontamination and disposal, as an example, in a correctly controlled landfill.

Incineration is a radical method for waste disposal. That way, waste is destroyed so that health care related risks can be reduced. However, incineration is not the best form to treat and to eliminate wastes for it provokes smokes and ashes that cause both environmental and health problems.

In a second phase of HCWM plan implementation there will be a chance to install facilities for waste treatment and disposal that are more adequate in environmental terms. Also, these initiatives will be performed within a bigger number of HCE’s. The control of all the HCW in a vast country as Angola is, will be performed in a progressive way. “Good practices” meanwhile acquired from the experience should be used.

This way, it is suggested that each province should have a double chamber incinerating facility and each municipality should have a small dimension Montfort type incinerator.

The decision of installing a Montfort type incinerator in each municipality is related with investment issues. The ideal situation would be to equip all the small HCE’s with a incinerating facility of this type. However, according to data from the Ministry of Health, there are 926 health care posts and 249 health care centers. Providing all small HCE’s with incinerating facilities would mean a very high investment. Thus, it is proposed HCW transportation, from small HCE’s in the municipalities, to the HCE’s possessing the Montfort type incinerator, within the same municipality.

The decision of installing a double chamber incinerator in each Province capital is justified with the fact that in each Province capital waste generation is much bigger than in other localities. In Province capitals, it is also suggested the installation of autoclaves. These autoclaves should be a complement to incinerators, in order to decontaminating some hazardous health care waste. The installation of autoclaves will also allow preparing mentalities, as well as professionals and general population’s practices for a subsequent implementation of waste treatment and disposal processes. The autoclave should be located in the most important HCE of each province.

Appropriate manuals containing rules and information on the use of those autoclaves and incinerators, should be included in each province’s HCWM plan.

All HCE’s in Angola have significant lacks in terms of structures needing for that matter big rehabilitation related investments. In terms of rehabilitation, the proposal mentions only specific small dimension measures related with the HCW sector, like the rehabilitation of rooms for temporary storage, septic tanks/cesspits or places for incineration ashes burial.

Once again, taking into account the social-economic context of Angola and the existing differences, in terms of HCWM, between the situation in the remaining provinces and the situation in Luanda Province, the choice of the HCW technological and managing scenarios should have in account each province and city situation.

It is necessary and urgent to provide all the HCE’s with adequate equipment for waste segregation and collection. The amount of necessary equipment to attain this goal is very high. In order to present reasonable budgets, it is suggested the acquisition of diverse equipment in the following quantities: buckets= 1/Center, 10/Hospital; trolleys = 1/Center, 4/Hospital; sharps containers= 5/ Center, 25/Hospital; protective clothing = 1/ Center, 1/Hospital; storage equipment = 1/ Center, 4/Hospital; sharps destroyers= 1/ Center, 1/Hospital.
4.3.3.4 Annual estimate balance between health care waste generation and installed incinerating capacity in Angola

Waste generation estimate:

<table>
<thead>
<tr>
<th>Province</th>
<th>Hospitals Prod/year (kg)</th>
<th>Health Care Center Prod/year (kg)</th>
<th>Health Care Post Prod/year (kg)</th>
<th>TOTAL (Year) (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengo</td>
<td>41,063</td>
<td>13,140</td>
<td>54,750</td>
<td>108,953</td>
</tr>
<tr>
<td>Benguela</td>
<td>274,462</td>
<td>164,250</td>
<td>118,625</td>
<td>557,337</td>
</tr>
<tr>
<td>Bié</td>
<td>117,932</td>
<td>45,990</td>
<td>63,875</td>
<td>227,797</td>
</tr>
<tr>
<td>Cabinda</td>
<td>79,004</td>
<td>72,270</td>
<td>144,175</td>
<td>295,449</td>
</tr>
<tr>
<td>Huambo</td>
<td>186,752</td>
<td>236,520</td>
<td>80,300</td>
<td>503,572</td>
</tr>
<tr>
<td>Huila</td>
<td>150,617</td>
<td>137,970</td>
<td>180,675</td>
<td>469,262</td>
</tr>
<tr>
<td>Kuanza Kubango</td>
<td>159,158</td>
<td>26,280</td>
<td>27,375</td>
<td>212,813</td>
</tr>
<tr>
<td>Kwanza Norte</td>
<td>25,623</td>
<td>78,840</td>
<td>49,275</td>
<td>153,738</td>
</tr>
<tr>
<td>Kwanza Sul</td>
<td>82,289</td>
<td>118,260</td>
<td>197,100</td>
<td>397,649</td>
</tr>
<tr>
<td>Kunene</td>
<td>48,290</td>
<td>52,560</td>
<td>94,900</td>
<td>195,750</td>
</tr>
<tr>
<td>Luanda</td>
<td>426,065</td>
<td>223,380</td>
<td>23,725</td>
<td>673,170</td>
</tr>
<tr>
<td>Lunda Norte</td>
<td>121,709</td>
<td>32,850</td>
<td>21,900</td>
<td>176,459</td>
</tr>
<tr>
<td>Lunda Sul</td>
<td>31,536</td>
<td>19,710</td>
<td>58,400</td>
<td>109,646</td>
</tr>
<tr>
<td>Malange</td>
<td>101,507</td>
<td>118,260</td>
<td>91,250</td>
<td>311,017</td>
</tr>
<tr>
<td>Moxico</td>
<td>68,821</td>
<td>91,980</td>
<td>264,625</td>
<td>425,426</td>
</tr>
<tr>
<td>Namibe</td>
<td>58,145</td>
<td>39,420</td>
<td>60,225</td>
<td>157,790</td>
</tr>
<tr>
<td>Uíge</td>
<td>155,052</td>
<td>124,830</td>
<td>100,375</td>
<td>380,257</td>
</tr>
<tr>
<td>Zaire</td>
<td>42,048</td>
<td>39,420</td>
<td>58,400</td>
<td>139,868</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,170,071</strong></td>
<td><strong>1,635,930</strong></td>
<td><strong>1,689,950</strong></td>
<td><strong>5,495,951</strong></td>
</tr>
</tbody>
</table>

Table 13: Annual Waste Generation Estimate

The estimate of installed incinerating capacity results is:

Montfort type Incinerators (capacity of 30kg/day) = 1,916,250 Kg

Double chamber Incinerators (18, daily average production capacity 300kg/day) = 1,971,000 Kg

Total: 3,887,250 Kg

Deficit/year = 1,608,701 kg

4.3.4. Foreseen measures

This strategic vector consists in the acquisition of the minimum necessary equipment in order to implement the HCWM plan and to create conditions so that the equipment can work. Thus, the amount of generated waste will condition the kind of equipment to be purchased, that is, for the hospitals the type of incinerating equipment will be different of the one in health centers.

Measures considered necessary to implement this strategic vector are:

- Broad study to all the provinces on adequate solutions and its quantification, since the survey performed only contemplated five provinces.
- Administrative procedures related with call for tender for equipment acquisition (call for tender opening, “procurement”, selection and inspection).
- Previous meetings with HCE’s for analyzing equipment delivery evolution.
- Materials and equipment supply.
- Waste treatment and storage infrastructures building or rehabilitation.
4.4. STRATEGIC VECTOR 4: TRAINING

4.4.1. Introduction

The remarkable technological evolution during the last few decades, namely regarding computing systems led to the need of significant change within all phases constituting any economical process. From the conception of the products to its use by common consumers, methods, equipment and related administrative and commercial processes suffered radical changes.

New technologies within HCE’s are essential in order to obtain a better quality in service. They constitute a factor of progress, conducing to improved results with increased social and economical impact. That is why governments, public and private entities, teaching institutions and all structures supporting the health care system in Angola should invest on new technologies.

Investment on citizen’s training is a mandatory condition for development. Beyond the regular functioning of the regular teaching system (basic school, secondary school and university), there is the need of professional training, namely training for the personnel directly involved in the HCWM process.

Human resources constitute the most important component in any economical activity. Concerning HCWM there is a need for training personnel intervening at all the stages of the process, personnel within HCE’s, personnel in the Ministries related to this subject, people working in the Provincial Governments, and other public and private entities (ONG’s, etc.).

Within this context, some changes in terms of training policies should be done, in order to face the requirements of the HCWM Plan. The goal of this specific training program is to prepare qualified and motivated technicians who can assure, in a professional and efficient way, all the tasks of HCWM processes. For that purpose, the training plan should allow an oriented training for the involved agents.

All the HCE’S staff, medical staff (including senior doctors), should be aware of the importance of HCWM policies and consequently HCWM-related training. That will lead to their collaboration on these policies implementation. Simultaneous presence of different categories of HCE’s employees in each course would be a benefit. At least a doctor or a nurse should be present in each module or training course. Also, the presence of elements of the HCE’s administration would be useful, showing commitment with the HCWM policy.

4.4.2. Training plan

The training plan will include several kinds of courses:

On a central level:
- Training course for trainers (HCWM trainers)

On a provincial level:
- Training course on organization and HCWM within HCE’s;
- Training course for maintenance and collect / cleaning personnel;
- Training courses for health care professionals (medical staff, nurses and support staff);
- Training courses landfills and incinerators operators;

Training course for trainers foresees visits to Hospitals and Health Care Centers.
Training course for trainers must be attended by at least one element representing each Angolan Province so that this training can be organized later at provincial and HCE level.

The following list enumerates the training courses we understand necessary for qualifying human resources needed to assure the correct development/implementation of the HCWM plan.

**4.4.3. Training course for trainers (HCWM trainers)**

**GOALS**
To qualify human resources to instruct training courses in the HCWM sector.

**TRAINNEES**
Candidates who want to be trainers within training actions included on the HCWM plan. A least one element of each province of Angola will be selected. In bigger provinces, at least two elements will be selected.

**PROGRAM:**
- Health Care Waste: Basic concepts and notions
- Basic HCWM operations: segregation, collect, storage and disposal
- Risks related to health care waste
- Issues on waste management policies: legislation and regulation
- Roles and responsibilities of those participating in the HCWM process
- Records and reports in terms of health care waste
- Procedures for emergency response
- Safe practices: technical instructions
- Protective clothing and personal hygiene
- Pedagogic methodologies
- Training and awareness-raising techniques

**NUMBER OF TRAINNEES:** 25

**COURSE COORDINATOR**
International Consultant

**SCHEDULE**
The training action will last for 2 weeks, 5 days a week - (Total - 50 hours)
Morning: 4 hour sessions on the class (40 hours)
Afternoon: visits to hospitals and health care centers (10 hours)
Schedule includes time for questions and discussion of case studies concerning the different chapters of the program. The training sessions will include theory and practical examples

**TRAINING LOCATION**
Luanda or another Province capital

**4.4.4 Course 1 - Training course on Organization and Management of Health Care Waste within HCE’s**

**GOAL**
Sensitize trainees to sustainable organization and management of health care waste within HCE’s

**TRAINNEES**
Managers and administrative personnel within the hospitals, health care center directors, officers In charge of the implementation of legislation and regulations, on this domain, on a provincial level

PROGRAM
Administrative procedures: Legislation and regulations on waste
Keeping updated records; reporting and information on spills, accidents and other incidents.
Some topics on HCWM policy
Roles and responsibilities of those participating in the HCWM process
Basic HCWM operations: segregation, collect, storage and disposal
Risks related to health care waste
Issues on waste management policies: legislation and regulations
Statistical treatment of health care waste
Safe practices: Technical instructions
Protective clothing and personal hygiene
Procedures for emergency response
Contingency measures for implementation during breakdowns or planned maintenance

NUMBER OF FORESEEN TRAINING ACTIONS: 18 (one action per Province)

NUMBER OF TRAINEES WITHIN EACH TRAINING COURSE: 25

TOTAL NUMBER OF TRAINEES IN THIS COURSE: 450

COURSE COORDINATOR
Trainer with proved experience on these HCWM-related subjects. Should have attended the training course for trainers (HCWM trainers)

SCHEDULE
The training action will last for 3 days (Total - 15 hours)
Morning: 5 hour sessions on the class
Schedule includes time for questions and discussion of case studies concerning the different chapters of the program. The training sessions will include theory and practical examples.

TRAINING LOCATION
Province capitals (specific location to be indicated by province governments)

4.4.5. Course 2 - Training course for maintenance and collect/cleaning personnel

GOAL
Sensitize Trainees to health care waste related risks and sensitize on safe practices

TRAINEES
Cleaning personnel, personnel who transports patients and equipment, health care waste handlers and other support staff

PROGRAM
Basic concepts and notions on health care waste
Health care waste segregation
Risks related to health care waste
Appropriate procedures for waste handling, as well as loading and unloading health care waste bags and containers
Proper procedures in case of spills and other accidents
Technical instructions on wearing / using personal protective clothing
Health care waste related documentation and records

NUMBER OF FORESEEN TRAINING ACTIONS: 18 (one action per Province)

NUMBER OF TRAINEES WITHIN EACH TRAINING COURSE: 25

TOTAL NUMBER OF TRAINEES IN THIS COURSE: 450

COURSE COORDINATOR
Trainer with proved experience on these HCWM-related subjects. Should have attended the training course for trainers (HCWM trainers)

SCHEDULE
The training action will last for 2 days (Total - 10 hours)
Morning: 5 hour sessions on the class
Schedule includes time for questions and discussion of case studies concerning the different chapters of the program. The training sessions will include theory and practical examples

TRAINING LOCATION
Province capitals (specific location to be suggested by province governments

4.4.6. Course 3 - Training courses for health care professionals (medical staff, nurses and support staff)

GOALS
Sensitize trainees to health care waste related risks and sensitize on safe practices:

TRAINEES
Medical staff, nurses and support staff

PROGRAM:
Basic concepts and notions on health care waste
Health care waste segregation
Risks related to health care waste
Safe practices: technical instructions on wearing protective clothing and personal hygiene
Roles and responsibilities of those participating in the HCWM process
Health care waste related documentation and records
Proper procedures in case of spills and other accidents
Procedures for emergency response

NUMBER OF FORESEEN TRAINING ACTIONS: 18 (one action per Province)

NUMBER OF TRAINEES WITHIN EACH TRAINING COURSE: 25

TOTAL NUMBER OF TRAINEES IN THIS COURSE: 450

COURSE COORDINATOR
Trainer with proved experience on these HCWM-related subjects. Should have attended the training course for trainers (HCWM trainers)

SCHEDULE
The training action will last for 2 days (Total - 10 hours)
Morning: 5 hour sessions on the class
Schedule includes time for questions and discussion of case studies concerning the different chapters of the program. The training sessions will include theory and practical examples.

TRAINING LOCATION
Province capitals (specific location to be suggested by province governments)

4.4.7. Course 4 - Training courses landfills and incinators operators

GOAL
Sensitize trainees to health care waste related risks and sensitize on safe practices

TRAINEES
Landfills and incinaters operators

PROGRAM
Basic concepts and notions on health care waste
Implications of landfills and incinaters’ operations on environment, health and safety
Global functioning of the treatment facility
Technical procedures for operating the facility
Facility maintenance and recording process
Emergency response in case of occupational accidents
Appropriate procedures for health care waste reception, handling, storage and disposal
Technical instructions on wearing personal protective equipment

NUMBER OF FORESEEN TRAINING ACTIONS: 18 (one action per Province)

NUMBER OF TRAINEES WITHIN EACH TRAINING COURSE: 25

TOTAL NUMBER OF TRAINEES IN THIS COURSE: 450

COURSE COORDINATOR
Trainer with proved experience on these HCWM-related subjects. Should have attended The training course for trainers (HCWM trainers)

SCHEDULE
The training action will last for 2 days (Total – 10 hours)
Morning: 5 hour sessions on the class
Schedule includes time for questions and discussion of case studies concerning the different chapters of the program. The training sessions will include theory and practical examples

TRAINING LOCATION
Province capitals (specific location to be suggested by province governments)

4.4.8. Foreseen Actions

- Training course for trainers (HCWM trainers) – 1 training course.
- Course 1 - Training course on Organization and management of health care waste within HCE’s – 18 training courses, one in each province.
- Course 2 - Training course for maintenance and collect/cleaning personnel - 18 training courses, one in each province.
- Course 3 - Training courses for health care professionals (medical staff, nurses and support staff) -18 training courses, one in each province.
- Course 4 - Training courses for landfills and incinerators operators - 18 training courses, one in each province.
- Seminars- three (3) seminars on training courses programs and teaching methodologies.
- Meetings – Five (5) broad annual meetings with trainers.

4.4.9. Training courses quantification

Total number of training courses: 73
Total number of trainees: 1825
Total number of training hours: 860
Total number of training hours *number of trainees: 21500

4.4.10. Training Methodology – Table

![Training Structure Diagram]

Figure 33: Training Structure

4.5. STRATEGIC VECTOR 5: Sensitizing and awareness raising

4.5.1. Introduction

Projects can only be implemented if people are aware of their importance. General population (including a special attention to youth), and particularly health care personnel, should be strongly sensitized, so that a HCWM program can be successfully implemented.

It is dare to work on this kind of subjects because it assumes change of habits acquired for years, sometimes related to local cultures and traditions. Frequently this is only achieved a few generations passed.
Thus, this fifth strategic vector must be very well prepared in order to approach the previously defined target groups. Indeed, for each target group it is proposed a specific sensitizing/awareness raising campaign. In each situation, the most suitable media or other resource should be chosen so that the target group can assimilate the message.

<table>
<thead>
<tr>
<th>Only with population sensitizing and awareness raising measures positive outcome will result from this program</th>
</tr>
</thead>
</table>

As mentioned, there are three target groups with different communication related requirements and therefore different foreseen actions.

### 4.5.2. – Sensitizing Health Care Personnel and Foreseen Actions

In order to improve health care waste control and to allow a more efficient HCW management on a short term, sensitizing the personnel is a fundamental and urgent measure.

This strategy includes conferences, work groups/meetings and interviews with leaders, managers and HCE’s heads. These measures should comprise the use of relevant technical information. Production of posters, brochures and other propaganda products (on the HCWM subject), specifically for this target group is another component of this sensitizing strategy.

**Foreseen actions:**

- Disclosure Conference at the starting phase of the project
  - Date: Beginning of the project
  - Attendees: Ministries’ representatives, provincial representatives, hospital directors / heads, health care posts’ heads, public and private entities
  - Location: Luanda
- Disclosure Conference at the final phase of the project
  - Date: Final phase of the project
  - Attendees: Ministries’ representatives, provincial representatives, hospital directors / heads, health care posts’ heads, public and private entities
  - Location: Luanda
- Meetings in all province capitals (18)
- Production and distribution of a poster specially conceived for health care professionals
- Production and distribution of T-shirts

### 4.5.3. - Sensitizing youth and foreseen actions

In Angola, youth represents the largest age group. Young people within learning/studying age (between 5 and 24 years old) represent 45% of the Angolan population. This is one of the reasons why sensitizing measures are specifically proposed for this age group.

Sensitizing youth in Angola is important investment concerning the present but also regarding to the future:

- Nowadays, there is a significant number of young people who search for a way of survival in garbage deposits. Everyday, hundreds of children visit waste deposits searching for daily sustenance.
- Because a sensitized young will be in the future a man or woman more responsible regarding generation, handling and disposal of all kinds of waste, major environmental problems can only be solved when youth becomes sensitized to its importance and to the need of waste control, reduction and disposal.
Sensitizing strategies demand work to be done in cooperation with the Ministry of Education and schools, including the definition and creation of specific school programs and documents specifically conceived to promote proper waste related practices.

Respecting to the Ministry of Education, it is proposed that this subject is included in the existing disciplines’ programs related with environmental issues, hygiene and public health. An institutional involvement is required for the implementation of the foreseen actions in schools.

Concerning schools level, strategy implementation comprises on-site environmental related events, drawing activities and articles writing on HCWM subjects in newspapers and magazines. For that purpose, support products will be distributed, such as technical documents, posters, leaflets and propaganda products (T-shirts, caps, etc.).

Foreseen Actions:

- Disclosure Conference at the starting phase of the project
  - Date: Beginning of the project
  - Attendees: Ministry of Education representatives, provincial education-related representatives, school directors / heads
  - Location: Luanda
- Meetings in within the Ministry of Education for assessment/analysis on school curricula and school discipline’s books
- Meetings with provincial education-related representatives, at all province capitals (18) for preparing the start of the drawing activities and environmental events at schools
- Production and distribution of an informative leaflet specially conceived for students
- Production and distribution of a poster specially conceived for students to be largely divulged in schools
- Production and distribution of T-shirts, caps, etc.

4.5.4 Sensitizing General Population and Foreseen Actions

Sensitizing general population will require the implementation of a national campaign using the most adequate resources, like advertisements on the media (radio and television), documentation (brochures, posters) and propaganda products (t-shirts, caps, etc.) to be distributed specially within HCE’s and other public locations.

Foreseen Actions:

- Elaboration and disclosure of an advertisement TV spot
- Elaboration and disclosure of an advertisement radio spot
- Meeting with public (central and provincial level) and private entities (companies and ONG’s) to start the National Sensitizing Campaign for general population
- Elaboration and distribution of information (leaflets) specifically conceived for general population, to be largely distributed at public locations
- Elaboration and distribution a poster specifically conceived for general population, to be largely divulged at public locations
- Elaboration and distribution of t-shirts, caps, etc.

5. LOGICAL STRUCTURE OF THE HCWM PLAN
<table>
<thead>
<tr>
<th>STRATEGIC VECTOR 1:</th>
<th>MAIN PURPOSES</th>
<th>MEASURES</th>
<th>PERFORMANCE INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforce institutional, legislative and regulation frame</td>
<td>Development of a consistent national policy</td>
<td>-Constitution of a team in order to prepare/elaborate legislation and regulations -Preparation/elaboration of that legislation (main/basic legislation and regulations) -Main/basic legislation and regulations -Legislation/regulations approval</td>
<td>-Documents on the Constitution of the team -Documents on the national main/basic law, legislation and regulations -Legislation issue/publication on the official newspaper</td>
</tr>
</tbody>
</table>

**Expected results:**
- Approval of a law on Health Care Waste
- Approval of specific regulations on Health Care Waste

<table>
<thead>
<tr>
<th>STRATEGIC VECTOR 2:</th>
<th>MAIN PURPOSES</th>
<th>MEASURES</th>
<th>PERFORMANCE INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Improve HCWM in Angola -Statistic treatment of Health care waste</td>
<td>-Organization of hospital management at Ministry of Health, Provincial Governments and HCE’s levels -Assignment of responsibilities of the directly involved agents -Development of appropriate financing mechanisms -Involvement of HCE’s heads in order to obtain Statistic Information</td>
<td>-Annual national conference for evaluating the solutions developed in each HCE and for presentation of new proposals for refinement of the HCWM plan. -Project of technical assistance to the Ministry of Health in order to prepare/organize the HCWM plan. -Support to HCE regarding the elaboration of annual budgets comprising HCWM related expenses -Inspection and evaluation of the HCWM plan -Collecting, processing and saving statistic data obtained in HCE’s</td>
<td>-Terms of reference -Minutes of the meetings -Documents of the HCWM plan -Health care waste records -Reports of audits to the HCWM plan -Statistical analyses on health care waste</td>
</tr>
</tbody>
</table>

**Expected results**
- HCWM is successfully executed in the field, improving efficacy, in terms of tasks and processes
- Health care waste is correctly qualified and quantified

<table>
<thead>
<tr>
<th>STRATEGIC VECTOR 3:</th>
<th>MAIN PURPOSES</th>
<th>MEASURES</th>
<th>PERFORMANCE INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Provide collect and disposal equipment to HCEs as well as protective individual equipment/clothing, required for health care waste related operators</td>
<td>-Involvement of Ministries of Health, Public Works, Financial Affairs and Administration, as well as Provincial Governments -Involvement of the NGO’s</td>
<td>-Collection, treatment and storage equipment supply -Preparatory meetings with HCE’s (contracts, financial questions) -Construction or rehabilitation of infrastructures for intermediate storage -Supply of segregation and</td>
<td>-Document on the solution suggested for each province – Invoices related to provided equipment -Contracts with transporting entities -Writing of terms of reference</td>
</tr>
</tbody>
</table>

**Expected results**

### Angola’s National Health Care Waste Management Plan

**- HCEs are well equipped, in order to perform health care waste segregation, collect, storage and disposal operations - health care waste is safely segregated, collected, stored and disposed, in a non environmental-friendly and economically feasible way**

<table>
<thead>
<tr>
<th>STRATEGIC VECTOR 4:</th>
<th>MAIN PURPOSES</th>
<th>MEASURES</th>
<th>PERFORMANCE INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Involvement of international financing Institutions - Involvement of donor countries - Public aid Programs</td>
<td>collect equipment, as well as individual protective clothing</td>
<td>- Meetings records - Document on environmental impact evaluation and licenses’ authorization - Installed incinerating facilities - Installed landfills</td>
</tr>
<tr>
<td><strong>Expected results</strong></td>
<td>- Performance of short / medium courses and conferences, enhancing the risks inherent to health care waste</td>
<td>- Training course for trainers (HCWM trainers) - Training course on Organization And management of health care waste within HCE’s</td>
<td>- Documents of pedagogical support to training courses - Course dossiers containing information on the curricular plan, trainer and trainees -Number of trained staff</td>
</tr>
<tr>
<td></td>
<td>- Existence of a group of qualified and motivated technicians who will perform all the tasks foreseen within the HCWM plan</td>
<td>- Training course for maintenance and collect/cleaning personnel - Training courses for health care professionals (medical staff, nurses and support Staff) - Training courses for landfills and incinerators operators</td>
<td></td>
</tr>
</tbody>
</table>

### STRATEGIC VECTOR 5:

**Sensitizing and awareness-raising on hygiene, environmental and health care related risks issues**

<table>
<thead>
<tr>
<th>MAIN PURPOSES</th>
<th>MEASURES</th>
<th>PERFORMANCE INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitizing and awareness raising campaign with regard to leaders and managers, referring to risks inherent to health care waste</td>
<td>- Seminars and work groups / meetings with HCE’s heads -National informational Campaign in HCE’s using interviews and public sections, posters, informative brochures and propaganda products</td>
<td>- Documentation on the organization and performance of the conferences and work meetings - Documentation on the national campaigns</td>
</tr>
</tbody>
</table>

**Expected results**

- Sensitizing and awareness raising campaign with regard to leaders and managers, referring to risks inherent to health care waste

---

65/80
Population is more sensitized and conscious in terms of hygiene, environmental and health care related risks issues

mismanagement
-Sensitizing and awareness raising among in regard to general population
-Sensitizing and awareness raising among Youth

(T-shirts, caps, etc.)
-National Information Campaign and in general with regard to general population using advertisements in the media, outdoors advertisements, posters, informative brochures and products of propaganda
(T-shirts, caps, etc.)
-National informational campaign in regard to youth with the inclusion of the HCWM subject in the disciplines’ program / contents and through the writing Of articles in newspapers and magazines, drawing contests And events in the schools, like “Environmental Days”

programs namely informative and propaganda actions On the media, published articles, posters and distributed propaganda products
- Documentation on the elaboration of the drawing activities and chosen drawings
- Documentation on the organization and performance of environmental days
- School books

Table 14: Logical Structure of the HCWM Action Plan

6. PLAN IMPLEMENTATION

6.1 Detailed Activities

6.1.1 Starting phase

These are the foreseen measures within the starting phase, in order to attain the defined strategic vectors:

Strategic Vector 1: Reinforce institutional, legislative and regulation frame

Constitution of a team on a central level in order to prepare / elaborate legislation (a basic / main law, other legislation and regulations).

Strategic Objective 2: Organizing and Managing

National starting conference with the participation of entities directly related with the HCWM sector, public and private, entities on a central or provincial level.

Strategic Objective 3: Installing and Equipping

Study, broad to all provinces, on adequate solutions and respective quantification, since the survey already made analyzed only five provinces.

Strategic Objective 4: Training

National starting conference including debates on courses’ programs and training methodologies.
Preparatory meeting with trainers.

Strategic Objective 5: Sensitizing and awareness raising
Health care personnel sensitization:
- National starting divulge conference
  - Attendees: Representatives of the Ministry of Health, provincial representatives, hospital directors / heads, health care posts’ heads, public and private entities
  - Elaboration of information (informative brochure) specially conceived for health care agents
  - Elaboration of poster specially conceived for the health care agents
  - Elaboration of T-shirts

Youth sensitization:
- National starting Divulge Conference
  - Attendees: Representatives of the Ministry of the Education, education related provincial delegates, school directors
  - Meeting in the Ministry of Education for analyzing scholar curricula and school manuals
  - Elaboration of information (informative brochure) specially conceived for students
  - Elaboration of poster especially conceived for the health care agents students, to be widely divulged in schools
  - Elaboration of T-shirts, caps, etc.

General population sensitization
- Elaboration of one television advertising
- Elaboration of one radio advertising
- Meeting with public entities at central and provincial levels and with private entities (companies and NGO’s for the start of the national population sensitization campaign.
  - Elaboration informative brochure specially conceived for students
  - Elaboration of poster specially conceived for general population to be widely divulged in public locations
  - Elaboration of t-shirts, caps, etc

6.1.2 Execution Phase

These are the foreseen measures within the execution phase, in order to attain the defined strategic vectors:

Strategic Objective 1: Reinforce Institutional, Legislative and Regulation Frame

Constitution of a team in order to prepare / elaborate legislation and regulations
Preparation / elaboration of that legislation (main / basic law, legislation and regulations)
Legislation / regulations approval

Strategic objective 2: Organizing and Managing

Project of technical assistance to the Ministry of Health in order to prepare and organize the HCWM plan.
Support to HCE’s regarding to the elaboration of annual budgets comprising HCWM related expenses.
Inspection and evaluation of the HCWM plan.
Collecting, processing and saving statistic data obtained in HCE’s.

Strategic Objective 3: Installing and equipping
Administrative procedures related with call for tender for equipment acquisition (call for tender opening, “procurement”, selection and inspection).
Previous meetings with HCE’s for analyzing equipment delivery evolution.
Distribution of equipment.
Construction or rehabilitation of waste treatment and storage infrastructures.

Strategic Vector 4: Training

Training course for trainers (HCWM trainers) - 1 training course

Course 1 – Training course on Organization and management of health care waste within HCE’s – 18 training courses, one in each province
Course 2 - Training course for maintenance and collect / cleaning personnel - 18 training courses, one in each province
Course 3 - Training courses for health care professionals (medical staff, nurses and support staff) - 18 training courses, one in each province
Course 4 – Training courses for landfills and incinerators operators - 18 training courses, one in each province

Seminars – three (3) seminars on courses’ programs and training methodologies
Meetings – five (5) annual preparatory meetings with trainers

Strategic Vector 5: Sensitizing and Awareness Raising

➢ Health care personnel sensitizing:
Meetings in all the provincial Capitals (18)
Distribution of information (informative brochure) specially conceived for health care agents
Distribution of poster specially conceived for health care agents
Distribution of t-shirts

➢ Youth (at studying age) sensitization
Meetings with provincial education delegates in all province capitals (18) for starting of environmental events and drawing activities
Distribution of information (informative brochures) specially conceived for students
Distribution of poster specially conceived for students and to be widely divulged in schools
Distribution of t-shirts, caps, etc

➢ General population sensitization
Divulge / presentation of one television advertising
Divulge / presentation of one radio advertising
Meetings with public entities at central and provincial levels and with private entities (companies and NGO's) for the start of the national population sensitization campaign.
Distribution of information (informative brochure) specially conceived for general population
Distribution of poster specially conceived for general population to be widely divulged in the public places
Distribution of t-shirts, caps, etc.

6.1.3 Evaluation Phase

Within the whole project an external evaluation will be performed by consultant.
This evaluation will be performed at three distinct moments: at the initial phase, in the middle of the program and at the final phase.

Evaluation will be performed on two strategic vectors, therefore:
Strategic Vector 2: Organizing and Managing

National annual evaluation conference, in order to assess solutions developed by each HCE and new proposals for refinement of the HCWM Plan, with the participation of entities directly related with the HCWM sector, public and private, entities on a central and on a provincial level.

Strategic Vector 5: Sensitizing and Awareness Raising

Evaluation conference at the final phase of the project
Date: end of the project
Attendees: ministries’ representatives, provincial representatives, hospital directors, health care centers’ directors, public and private entities
Place: Luanda

6.2. Post-Project Phase

At the end of the execution phase of this HCWM project, some changes in terms of HCWM should have been achieved. Therefore:

- Legislative frame should be adequate and its execution should be a reality.
- Structures of the HCE’s where the plan will be implemented should have been improved and the acquired equipment should be functioning
- As a direct consequence of sensitizing campaigns and training courses, it is expected that, at the end of the execution of this plan, public opinion will be more receptive to the environmental subject and population is more conscious of the serious consequences of health care waste mismanagement. Within the referred sensitization, a special approach should be performed towards the directly involved agents, this means, health care personnel, maintenance staff, collect staff and, finally, personnel working in incinerating facilities and landfills.

However, a HCWM plan does not have to be static and does not have to terminate at the end of the project. During all phases of project implementation, each single sector of the HCWM plan will be prepared for the post-project phase. Although in an incomplete form, some important initiatives can already be mentioned. Those initiatives should be implemented for attaining the purpose of consolidating and improving HCWM situation in Angola, in terms of waste collect, processing and disposal:

- Investment in the health care sector the must be continued and reinforced
- Organization and the management of HCW related activities must be reinforced and extended to all the provinces of Angola
- Implementation of the plan must be extended to all HCE’s.
- New equipment and technologies of waste treatment and disposal should be introduced in a progressive way, namely recycling, autoclave and decontamination technologies, among others. That way, the effectiveness and efficiency of the HCWM will increase.
- Training courses must be continued after the end of the project so that more skilled professionals are available.
- Sensitizing campaigns must continue and become permanent, in conjunction with other related subjects, like hygiene and public health.

6.3. Main Actors and Performance Rules

The execution of this plan can only be truly efficient with continuous and proactive cooperation of some entities and agents who are directly related with health care waste management issues.
The synergies created by team work will allow facing with more optimism this important Angolan problem.

In the following lines will be presented the main entities that can and should participate in this project and the performance rules that must prevail:

6.3.1 Main Actors and Performance Rules

HCWM interpolates several categories of entities whose roles and ways of implication have impacts that can influence, in differentiated ways, the effectiveness of the HCWM plan execution.

Central national Government:
Central National Government is responsible for financing the HCWM Plan, through the inclusion of the foreseen expenses on the national general budget, or by searching / asking for financial support to international entities / organizations or bilateral / multilateral agreements.

Ministry of Health
Ministry of Health is responsible for the elaboration and the execution of the national health policy, thus tutoring installations that constitute the main HCW generating sources. In this Ministry, the National Public Health Direction and its provincial ramifications, as well as the “Sanitary Districts”, are directly implied entities regarding the execution of the HCWM plan. They can provide a precious support to the (plan’s) supervision and actively increase the dimension of sensitization measures.

Ministry of Education:
This Ministry is responsible for the school disciplines’ contents in Angola. Thus, this Ministry is responsible for supporting sensitization on HCWM on a school level.

Ministry of Public works:
This is the Ministry responsible for financing and constructing infrastructures necessary to the implementation of the HCWM plan, either sanitary or road infrastructures.

Provincial governments and municipalities:
As central government’s ramifications, these entities are in charge of the inspection, supervision and execution of the HCWM plan. This way, the roles played by the referred entities within key-points of the plan is important, namely roles related with legislation, waste management and collect, training and sensitization.

Public and private HCE’s:
HCE’s are the main HCW generating sources. Thus, a key for the success of the execution of the HCWM plan is health care waste segregation and treatment, to be performed within these establishments. In public HCEs, there is a low level of engagement among health care professionals in regard with HCWM practices, precisely an issue that should play a central role. These professionals are daily involved with a considerable mass of medical urgencies, but above all with functioning difficulties: indeed, financial limitations certainly compromise initiatives, namely those needed to improve HCWM. At the level of private HCEs, limitations are less intense in the case of professional clinics. This way, adoption of technical HCWM tutorials by HCE’s is a priority). HCE’s role in terms of sensitizing its staff, but also general population, is essential; moreover, it is within these establishments one can find the biggest exposure levels to risks related with contaminated waste.

NGO’s, Community Organizations, Religious Organizations:
Many of these entities are actively interested in environmental and health domain, but currently none of them truly operates in general waste management. Experience that this kind of organizations possess in sensitization and education domains, could be a key-point regarding the execution of the activities within this project, namely through the mobilization of the other entities, in order to stimulate a stronger dynamic of fight against AIDS. These Organizations are involved in local development activities, often multidisciplinary, presenting also the advantage of having the confidence of the populations.

The Media:
The role of the media is essential with regard to the execution and divulge of sensitization plans.

Partners for development (WB, UNICEF, OMS, ADB, bilateral cooperation, etc):
Partners for development are fundamental for the development of countries like Angola. The role played by these entities is crucial, not only in terms of financing the plan, but also in terms of support to the HCWM plan evaluation and inspection.

UNEP / WHO:
Knowledge and large experience that these entities possess, in terms of elaboration and implementation of HCWM plans, are an added value, namely in terms of support to legislation elaboration and also in the assistance to training.

### 6.3.2. Partnership Summary Table

In the following table, a partnership summary is presented, where performance rules referring to the different entities are described, taking into account the different strategic objectives of the plan.

<table>
<thead>
<tr>
<th>ACTORS</th>
<th>Strategic Vector 1: Reinforce institutional, legislative and regulating frame</th>
<th>Strategic Vector 2: Organizing and managing</th>
<th>Strategic Vector 3: Installing e quipping</th>
<th>Strategic Vector 4: Training</th>
<th>Strategic Vector 5: Sensitizing and awareness raising</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central (national) Government:</td>
<td>Financing through own Funds; Search for financing next to national and international entities</td>
<td>Equipment acquisition</td>
<td>Supervision</td>
<td>Supervision</td>
<td>Inform and sensitize national and local authorities</td>
</tr>
<tr>
<td>Ministry of Health, National Direction for Public Health and Environment</td>
<td>Legislation elaboration</td>
<td>Support to HCWM plans elaboration at provincial and HCE’s level Supervision</td>
<td>Supervision</td>
<td>Supervision</td>
<td>Inform and sensitize national and local authorities</td>
</tr>
<tr>
<td>Ministry of Education:</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>Participate actively at sensitizing campaigns</td>
</tr>
<tr>
<td>Ministry of Public works:</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
<td>____</td>
</tr>
<tr>
<td>Provincial governments and municipalities:</td>
<td>Implementing legislation at local level</td>
<td>____</td>
<td>Improve collect system</td>
<td>Divulge training actions among possible candidates (Health care agents and other)</td>
<td>Participate at sensitizing campaigns</td>
</tr>
<tr>
<td>Public HCEs:</td>
<td>Execute (respect) regulation and enforce regulation compliance</td>
<td>Elaborate HCWM plans; Assure partnerships with private sector for collect and treatment.</td>
<td>Inspecting and keeping up with installation; Assuring maintenance.</td>
<td>Participate on training and incentive local staffs’ participation.</td>
<td>Promote sensitizing and awareness raising among health care professionals (doctors, medical personnel, nurses, etc.), cleaning teams, patients and respective families.</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Private HCEs:</td>
<td>Execute regulation and enforce regulation compliance</td>
<td>Elaborate HCWM Plans; Assure partnerships with private sector for HCW collect and treatment.</td>
<td>Collect and individual protective clothing acquisition Partnership with the private sector for disposal equipment acquisition and HCW collect and treatment</td>
<td>Participate on training and incentive local health care personnel participation</td>
<td>Promote sensitizing among personnel, patients and families.</td>
</tr>
<tr>
<td>NGOs, community organizations and religious organizations:</td>
<td>Support in terms of regulation divulge</td>
<td>Support in terms of management and financing</td>
<td>Support to financing and to search for financing .</td>
<td>Participate on the training Train volunteers</td>
<td>Participate in sensitizing; Mobilize the Population; Sensitizing specifically children living on the streets and poor people who find their means of survival among waste</td>
</tr>
<tr>
<td>The Media:</td>
<td>Divulge of legislation / regulations</td>
<td></td>
<td></td>
<td></td>
<td>Participate actively at sensitizing campaigns (for example, television advertisements)</td>
</tr>
<tr>
<td>Partners to development (WB, UNICEF, WHO, ADB, bilateral Cooperation, etc):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNEP/WHO</td>
<td>Support to elaboration</td>
<td></td>
<td></td>
<td>Assistance to training</td>
<td></td>
</tr>
</tbody>
</table>

Table 15: Partnership Summary
### 6.4. Plan Schedule

<table>
<thead>
<tr>
<th>MEASURES AND PROJECTS</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
</tr>
<tr>
<td></td>
<td>1S 2S 3S 4S 5S 6S 7S 8S 9S 1S 2S 3S 4S 5S 6S 7S 8S 9S 10S</td>
</tr>
</tbody>
</table>

**Strategic Objective 1: Reinforce institutional frame**
- Constitution of a team in order to prepare / elaborate legislation
- Elaboration of a basic law, legislation and regulations
- Basic law, legislation and regulations approval

**Strategic Objective 2: Organizing and Managing**
- National starting conference
- Annual National Seminar for solutions’ evaluation
- Technical assistance to the Ministry Of Health
- Support to elaboration of annual budgets
- Inspection and evaluation of the HCWM plan implementation
- Collect, processing and storage of statistic data

**Strategic Objective 3: Installing and equipping**
- Study in regard to all provinces on adequate solutions
- Call for tender for equipment acquisition
- Meetings with HCEs
- Equipment and materials distribution
- Infrastructure construction and rehabilitation

**Strategic Objective 4: Training**
- Training course for trainers (HCWM trainers)
- Training course on Organization and HCWM within HCE’s
- Training courses for health care professionals (medical staff, nurses and support staff)
- Training course for maintenance and collect / cleaning personnel
- Training courses for landfills and incinerators’ operators
- Conferences
- Work meetings

**Strategic Objective 5: Sensitizing and awareness raising**
- Starting and final conferences
- Work meetings with the leaders in the provinces
- Elaboration of information (informative brochures)
- Elaboration of posters
- Elaboration of T-shirts
- Elaboration of one television advertisement
- Elaboration of one radio advertisement
- National informative campaign – Health care personnel
- National informative campaign – General population
- National Informative Campaign – Youth

Table 16: Plan Schedule

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### 7. EVALUATION OF NEEDS AND FINANCIAL ESTIMATE

#### 7.1. Evaluation of Needs

Within the HCWM sector in Angola, there are different kinds of needs, at different levels. In general terms, needs / lacks are common in terms of:

1. Structures and equipment
2 Trained / sensitized human resources
3 Organization and management

The above referred needs are notorious at all levels. Naturally, at a superior level and within the central National Government, the most important lacks are related with health care system financing and with organization and management of the national HCWM plan. Also, another important lack is related with training for the Ministry of Health personnel. At the HCE’s level, lacks are of a different type. Indeed, infrastructures and equipment constitute priority needs, although at this level personnel and general population sensitization, as well as technical training are also vital needs for the HCWM process. Within the provincial governments, lacks are mainly related with human resources, personnel sensitization and financing the health care sector.

The quantification of presented needs correspond to a minimum platform for the improvement of the Health Care Waste Management System. The goal of this minimum platform is to conciliate suitable solutions, in order to guarantee health care waste disposal, with controlled environmental impact, and reasonable investments. The presented proposals are beneath the necessities, both in terms of quantity and in terms of quality. Achieving a reasonable solution was always our orientation. In a second phase of implementation of the Health Care Waste Management Plan, there will be the opportunity to install other waste treatment and disposal facilities. These should be more “environmentally friendly”. Also, it will be possible to perform these improvements within a larger number of HCE’s. The control of all health care waste in such a vast country, like Angola, will have to be attained progressively. “Good practices” meanwhile acquired should be used for that purpose. Therefore, both investments and the “non-material” component of each phase of the project will be more reasonable. Therefore it will be possible to get a better relation between cost and benefit and much more obvious social and environmental impacts.

Solutions were directed so that concentrated disposal of generated HCW, would be performed in hospitals located at province capitals, through the use of medium/large dimension incinerators. HCW generated in HCE’s of smaller dimension, namely within the health care centers and health care posts, will be incinerated by low cost smaller incinerators, at the municipalities.

Regarding staff training, training strategy foresees the performance of a training course for trainers that will prepare a set of 25 technicians, who will have the responsibility of training and sensitizing health care staff in all the provinces. This way, there will be a multiplication of the training courses, which therefore will be attended by a higher number of health care professionals.

Sensitization measures will have three distinct target groups: health care staff, youth at school age and general population. Thus, specific measures will be prepared and implemented specially for each of these three types of public.

In the following table, financial estimates are presented, for a 5-year period.

### 7.2 Financial Estimate

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Qt</th>
<th>Price/unit</th>
<th>Total $USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATEGIC VECTOR 1: Reinforce institutional, legislative and regulating frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juridical support</td>
<td>un</td>
<td>1</td>
<td>25,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
<td></td>
<td></td>
<td>25,000</td>
</tr>
<tr>
<td>STRATEGIC VECTOR 2: Organizing and managing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Angola’s National Health Care Waste Management Plan

#### Technical assistance

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Starting Conference</td>
<td>1 un</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Annual Seminar – experience exchange</td>
<td>4 un</td>
<td>15,000</td>
<td>60,000</td>
</tr>
</tbody>
</table>

#### External program evaluation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the start</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At mid-term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At the end</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sub-Total: 394,000

#### Note:
Technical assistance regarding statistical data organizing, inspection, collect, processing and filing

#### STRATEGIC VECTOR 3: Installing and equipping

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckets (1/Center;10/hospital)</td>
<td>un</td>
<td>457</td>
<td>18</td>
</tr>
<tr>
<td>Trolleys (1/center;4/hospital)</td>
<td>un</td>
<td>277</td>
<td>450</td>
</tr>
<tr>
<td>Sharps containers</td>
<td></td>
<td>Set 25</td>
<td>1,535</td>
</tr>
<tr>
<td>Protective clothing</td>
<td>Kit</td>
<td>187</td>
<td>50</td>
</tr>
<tr>
<td>Storage equipment</td>
<td>un</td>
<td>277</td>
<td>450</td>
</tr>
<tr>
<td>Rehabilitation – Health Care Centers</td>
<td>un</td>
<td>157</td>
<td>10,000</td>
</tr>
<tr>
<td>Rehabilitation – Hospitals</td>
<td>un</td>
<td>30</td>
<td>30,000</td>
</tr>
<tr>
<td>Sterilizing Autoclave</td>
<td>Big sized</td>
<td>un</td>
<td>5</td>
</tr>
<tr>
<td>Mid-sized</td>
<td>un</td>
<td>6</td>
<td>50,000</td>
</tr>
<tr>
<td>Small size</td>
<td>un</td>
<td>7</td>
<td>20,000</td>
</tr>
<tr>
<td>Double chamber incinerator</td>
<td>un</td>
<td>16</td>
<td>60,000</td>
</tr>
<tr>
<td>Montfort type Incinerator</td>
<td>un</td>
<td>175</td>
<td>2,500</td>
</tr>
<tr>
<td>Cesspits (1/Center;1/hospital)</td>
<td>un</td>
<td>175</td>
<td>500</td>
</tr>
<tr>
<td>Several tools (1/Center;1/hospital)</td>
<td>Set</td>
<td>175</td>
<td>100</td>
</tr>
<tr>
<td>Sharps destroyer (1/Center;1/hospital)</td>
<td>un</td>
<td>175</td>
<td>300</td>
</tr>
</tbody>
</table>

Sub-Total: 5,187,576

#### STRATEGIC VECTOR 4: Training

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training course for trainers (HCWM trainers)</td>
<td>un</td>
<td>2</td>
<td>15,775</td>
</tr>
<tr>
<td>Training course on Organization and HCWM within HCE’s</td>
<td>un</td>
<td>18</td>
<td>3,125</td>
</tr>
<tr>
<td>Training courses for health care professionals (medical staff, nurses and others)</td>
<td>un</td>
<td>18</td>
<td>2,450</td>
</tr>
<tr>
<td>Training course for maintenance and collect/cleaning personnel</td>
<td>un</td>
<td>18</td>
<td>2,450</td>
</tr>
<tr>
<td>Training courses for landfills and incinerators operators</td>
<td>un</td>
<td>18</td>
<td>2,450</td>
</tr>
<tr>
<td>Meetings</td>
<td>un</td>
<td>5</td>
<td>5,000</td>
</tr>
<tr>
<td>Conferences</td>
<td>un</td>
<td>3</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Sub-Total: 275,100

#### STRATEGIC VECTOR 5: Sensitizing and awareness raising

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television spots</td>
<td>un</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Radio spots</td>
<td>un</td>
<td>500</td>
<td>50</td>
</tr>
<tr>
<td>Bills / posters</td>
<td>un</td>
<td>5,000</td>
<td>2</td>
</tr>
<tr>
<td>Leaflets</td>
<td>un</td>
<td>20,000</td>
<td>1</td>
</tr>
<tr>
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Unforeseen charges 10% | 795,000 |

Total | 6,806,676 |

Unforeseen charges 10% | 680,668 |

TOTAL | 7,487,344 |

Table 17: Financial estimate
## Budget calculation

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7.3 Financing Plan

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## Financing Plan for The MHSS Components of The National HCWM Plan

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<th>Year 5</th>
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<td>Sterilizing Autoclave</td>
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<tbody>
<tr>
<td>Television spots</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td><strong>150,000</strong></td>
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<td>Radio spots</td>
<td>5,000</td>
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<td><strong>25,000</strong></td>
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<tr>
<td>Posters</td>
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<tr>
<td>Leaflets</td>
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<tr>
<td>T-shirt</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Drawing activities and other activities in schools</td>
<td>95,000</td>
<td>95,000</td>
<td>95,000</td>
<td>95,000</td>
<td>95,000</td>
<td><strong>475,000</strong></td>
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<tr>
<td>Sub-Total</td>
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<td></td>
<td></td>
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<td></td>
<td><strong>795,000</strong></td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>6,806,676</strong></td>
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<tr>
<td>Unforeseen charges 10%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>680,668</strong></td>
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<tr>
<td>TOTAL</td>
<td>529,609</td>
<td>1,312,524</td>
<td>4,021,993</td>
<td>1,213,267</td>
<td>409,934</td>
<td><strong>7,487,344</strong></td>
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8. CONCLUSIONS

The current situation of Health Care Waste Management in Angola cannot guarantee safety among health care establishment’s staff, patients and general population. Instead, current mismanagement constitutes a threat to the battle against transmittable diseases, like HIV/AIDS, tuberculosis or Hepatitis.

In Angola, important lacks can be noticed within all the vectors related with Health Care Waste Management. Often, the level of safety in health care waste handling and management is very low. Some of the most important gaps in HCE’s are related with organizational and management issues, human resources, equipment and structures. Insufficiency of financial resources constitutes also an important constraint.

Implementation of a Health Care Waste Management plan is a positive step towards the control of those diseases and improvement the hygienic and environmental conditions.

The involvement of all entities implicated in Health Care Waste Management is essential. An effective team-work connecting central services and health care establishments must be done. Public/private partnerships must be favored in order to implement the most appropriate solutions.

In Angola the national Health Care Waste Management steering Committee to be constituted must incentive the implementation of Health Care Waste Management plans in provinces.

It is crucial that all the health care personnel, at all levels, is aware of the importance of Health Care Waste Management, with regard to the improvement of sanitary conditions within each health care establishment.

Participation of hospital administrations and HCE’s heads commitment, with the HCWM planning process, are essential points for its success. Training programs must be implemented and performed in a continuous way.

Awareness-raising programs (for the whole community) regarding hygiene, environment and particularly HCWM should be largely implemented and performed in a permanent way, on a national level.
The quantification of presented needs correspond to a minimum platform for the improvement of the Health Care Waste Management System. The goal of this minimum platform is to conciliate suitable solutions, in order to guarantee health care waste disposal, with controlled environmental impact, and reasonable investments. The presented proposals are beneath the necessities, both in terms of quantity and in terms of quality. Achieving a reasonable solution was always our orientation. In a second phase of implementation of the Health Care Waste Management Plan, there will be the opportunity to install other waste treatment and disposal facilities. These should be more “environmentally friendly”. Also, it will be possible to perform these improvements within a larger number of HCE’s. The control of all health care waste in such a vast country, like Angola, will have to be attained progressively. “Good practices” meanwhile acquired should be used for that purpose. Therefore, both investments and the “non-material” component of each phase of the project will be more reasonable. Therefore it will be possible to get a better relation between cost and benefit and much more obvious social and environmental impacts.

Despite the national dimension of this project and the significance of the financial investment, the annual esteemed capacity of health care waste incineration, by the proposed equipment is of 3,887,250 kg, therefore insufficient. Indeed, the estimate of annual production is 5,495,951 kg. Thus, there is still a deficit of 1,608,701 kg. This means waste without any treatment or proper disposal after the conclusion of the project. This subject should deserve a special attention for the post-project phase.

This way, a contribution will be performed, in order to face the biggest health scourges in Angola.

The MHSS project adheres to the key objectives and activities of this action plan and will make use of the lessons learned from the implementation of the HCWMP during the HAMSET project to foster a sound management of health care waste at the national level. The MHSS project will emphasize implementation of this action plan in the targeted five targeted provinces of Bengo, Malange, Lunda Norte, Moxico, and Uige. However, this project will not be financing any new health care waste management facilities or any incinerators.