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**EVALUATION OF THE ENVIRONMENTAL IMPACTS OF MEDICAL
TRAINING: THE CASE OF THE MADINGRING DISTRICT MEDICAL
CENTER, NORTH CAMEROON**



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EVALUATION OF THE ENVIRONMENTAL IMPACTS OF MEDICAL TRAINING: THE CASE OF THE MADINGRING DISTRICT MEDICAL CENTER, NORTH CAMEROON

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Abstract

Purpose: The environment is increasingly threatened by human activities. The purpose of this study is to assess the impact of the different activities carried out at Madingring Medical Center on the various environmental components.

Methodology: To do this, the identification, characterization, and evaluation of the impacts were carried out during several field works using the Léopold and Fecteau matrices. The analysis of the waste management system was done using the Ishikawa 5M diagram.

Findings: During the study, the real and potential impacts were identified on the various environments. The incineration of medical waste is classified as hazardous and the poor management of toilets emits polluting and toxic substances into the air, as well as unpleasant odors that modify air quality. The presence of stagnant water from the activities of the medical center due to the lack of good drainage degrades soil quality. Added to this, there is a development of algae and moss on the site. Concerning waste management, it appears that the Center does not have an environmental permit and a waste management plan, the sorting carried out is approximate, hazardous waste is incinerated illegally and others are dumped in

landfills, contributing to environmental pollution. For each impact identified, corrective measures have been proposed and may make it possible to mitigate or eliminate the negative effects and improve the positive aspects, by implementing the environmental specifications.

Unique contribution to theory, practice and policy: At the end of this study, some recommendations were made. These include training of medical staff in best practices and techniques for medical waste management, monitoring of the implementation of regulations on hospital waste management in Cameroon, information and sensitization of users on the social and environmental impacts of environmental degradation, as well as the best practices and behaviors to adopt within health facilities, the use of bins for the collection and sorting of waste, the creation of a pre-collection unit of waste within the health centers of Cameroon in general and those of Madingring in particular.

Keywords: *Environmental impact, waste, incineration, Madingring.*

INTRODUCTION

Environmental change is continuous and alarming these recent years. The impacts of human activities are pollution, degradation of natural resources, the disappearance of ecosystems, and biodiversity such as plants, animals and their living environments have become a major concern for humanity. Since the awareness of the dangers that lie on the environment in 1972 during the Stockholm conference, environmental issues are now a priority in the processes of economic and social development in developed and developing countries, including Cameroon. In this international context, sustainable development with its concept of environmental impact assessment appears to be a major tool. This has led to integrating the environment into the planning of projects whose development is, at the base, economic. As a result, the negative consequences of human activities on the environment must be reduced. Therefore, the appropriate approach remains prevention, through more judicious choices than those in the past: environmental protection measure to reduce the direct effects of construction on the ecosystem, compensatory measure to offset certain negative effects, accompanying measure to influence building use patterns and land use planning measures. In terms of environmental risks, many reports deplore the inadequacy of both preventive control and curative measures and penalties for those responsible for pollution and nuisances (Melot and Pham, 2012).

Adoption of environmental assessments at the Rio summit in 1992 will do the general implementation by countries. Principle 17 of the Declaration of the Convention on Environment and Development states that: "Environmental impact assessment, as a national instrument, must be undertaken in the case of proposed activities which are likely to have significant harmful effects on the environment and depend on the decision of a competent national authority". Cameroon, having ratified this convention, has introduced environmental assessments in its policies while defining the types of studies to be carried out and listing the projects and establishments subject to it. These are Environmental and Social Impact Studies, Environmental and Social Audits, Strategic Environmental Assessments, and Environmental

Impact Notices. Depending on the project or facility, one or the other study is recommended. These projects include construction and operation of morgues, opening of community roads artisanal mining exploitation, health centers and similar, biomedical analysis laboratories, Schools/educational establishments, construction of markets and bus stations, development of communal cemeteries, development of municipal stadiums and playgrounds, construction and operation of a bakery, operation of a dry cleaner, operation of a printing shop, development of truck parking lots, etc.

This study aims to comply not only with this requirement but also with a view of preserving the environment, reason for the assessment of the environmental impacts of the Madingring medical center. It is a question of evaluating the impacts of the activity on the environment in this medical center. This specifically involves identification, evaluation, and characterization of the potential and real impacts of the activities on health facilities on the environmental components, identifying the failures in the waste management system, and proposing measures to mitigate or improve the impacts of the identified impacts.

The production of waste and the management systems put in place are characteristic of the way of life of the inhabitants of the society considered (Béguin, 2013). Many techniques are used in the world to treat waste, such as landfilling, composting, incineration, use in animal feed, etc. (De Silguy, 2009). Hospital waste requires appropriate management due to its hazardous nature. They have been the subject of many research works such as Béguin (2013), Datta *et al.* (2018), Nema and Ganesprasad (2002), Chartier *et al.* (2014), Li and Jenq (1993) and Balekouzou *et al.* (2016). In the Center Region of Cameroon, a similar study was conducted in 2021 by Djiyo *et al.* This study focused on the socio-environmental impacts of solid hospital waste management in the city of Yaoundé, capital of Cameroon. Most of these studies have adopted a methodological approach that is limited to the collection of information and therefore to an inventory of hospital waste management. Our work goes further by identifying, characterizing and evaluating the different impacts that a medical center can have on the environment and to that, we propose corrective measures for each identified impact. Moreover, we use in this study, the Ishikawa diagram to identify the failures of the waste management system in medical centers, something that the above-mentioned authors have not done.

STUDY FRAMEWORK

The medical center is located in the Department of Mayo-Rey specifically in the Madingring subdivision, North Region (Figure 1). The area is about 3,490 km² and has 58 villages and six neighborhoods in the urban space. According to Bucrep (2010), its population was estimated at 72,103 souls. It is made up of a peneplain dotted with valleys and a few small hills, the most important are: Hosséré Vaïmbou which culminates at 610 m, and Hosséré Doni at 502 m (Aubreville, 2001). The Kouloumbou and Goingou mountains are not the lowest. The relief is represented through the large landscape units staggered in altitude from the mountain ranges to the low alluvial plains. Each of these units contains varied soils and plays a very important role in the groundnut culture. The climate is one of the Sudano-

Guinean types, characterized by various contrasting seasons, a rainy season of four to five months with cumulative rains in July, August, and sometimes in September, and a dry season of seven to eight months. The average temperature is 28° with however a maximum of 35° in April-March and a minimum of 21° from December to February.

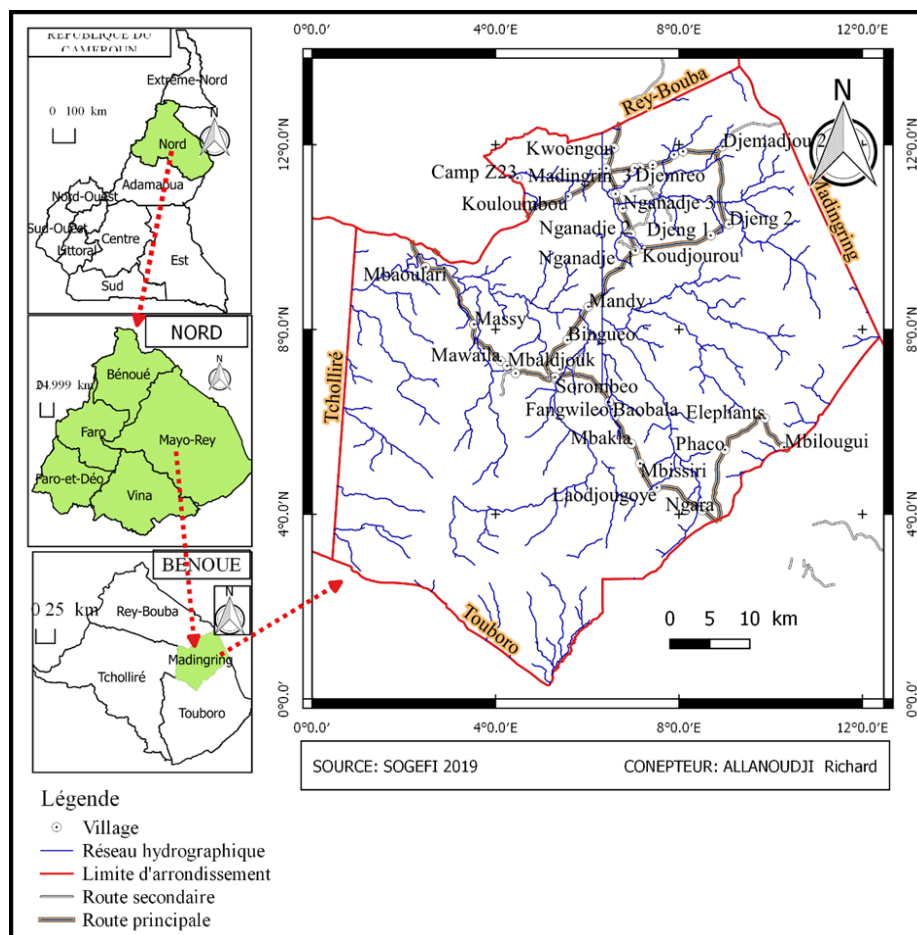


Figure 1: Location map of the study area

METHODOLOGY

The methodological approach used consisted of bibliographic research, field investigations and then data processing and analysis. The stage relating to the bibliographical research was based on the collection of information on the origin of the typology, the different modes of management (World Health Organization, 1999; Ngaroua, 2018) as well as the social and environmental impacts of solid waste management in the in general and in Cameroon in particular (Messi and Djenadek, 2016; Ngaroua, 2018). Two methods were adopted. The first concerns the identification, characterization, and evaluation of the potential and actual impacts of the Medical Center on the environment. It aims to propose measures to mitigate, compensate or prevent negative impacts on the environment and to recommend measures to improve positive impacts. The second method concerns the evaluation of the

method of management of hospital waste. To do this, among the several existing manners, the Ishikawa diagram was used.

Identification, characterization and assessment of environmental impacts

Identification of impacts

The identification of positive or negative impacts is based on the analysis of the effects resulting from the interactions between an affected environment and the various types of equipment or activities implemented (André *et al*, 1999). The acquisition as much as possible took several weeks. It is based on one hand on field visits which allow combing through all the facilities of the structure. On the other hand are interviews with health center officials, employees, and neighbors of the center. This information collected in the field is supplemented by documentary research. Available documents were useful for the high quality of the work. All the information collected leads us to establish a relationship between the sources of the impacts and the components of the different environments that could be affected. This relationship is either positive or negative.

Characterization of environmental impacts

Criteria are defined to determine the severity of each identified impact. This is the Nature of environmental impact. The nature of an impact can be positive or negative. It is Positive if the impact generated by a defined activity has positive effects on the environment (protection of biodiversity, economic development, etc.). It is negative if the impact generated by a defined activity has negative effects on the environment (degradation of the natural environment, risk of disease, water contamination, etc.). Another criterion for characterizing impact is interaction. It is a question of seeing if the impact is due to an activity generated directly from the activities of this establishment or to related activities. The interaction can therefore be either direct if the impact results from a project's activity according to a direct cause and effect linked or indirect if the environmental effect caused cannot be linked to an activity by a cause and effect link. Impact is caused by an action, but that occurs later or at a greater distance while being reasonably foreseeable. Predictability, i.e. the risk that the impact will take place, is also an important characterization criterion. It can be unlikely: the chance of such an impact occurring is very low, probable: the impact on the environment has a strong chance of occurring or Certain: the impact is predictable with certainty, it will occur. Another criterion is reversibility. An impact can be reversible if the impact generated disappears quickly on its own and/or with compensatory measures, persistent if the impact persists but can disappear over time and/or with compensatory measures, or even irreversible if the impact does not disappear with time or with compensatory measures. The extent of the impact is also an important criterion for its characterization. These are the effects of impact in space. She can be punctual if the impact only extends over a circumscribed area, local if the impact extends over the entire audited area of activity, or regional if the impact extends over the entire area of activity and on its near and distant environment. The intensity or severity of the effect of the impact on the

environment can be either low if the impact has a weak influence on ordinary environmental conditions (little deterioration or improvement), or medium if the impact has a significantly on ordinary environmental conditions (significant deterioration or improvement) or high if the impact modifies ordinary environmental conditions (significant positive or negative change).

Impact assessment

The scoring grid of Gaëtan and Raymond (2000) served as a methodological basis for assessment of identified impacts. The evaluation of these impacts makes it possible to define their magnitude. This will guide decision-making regarding the implementation of environmental protection measures. It focuses on negative impacts. The significance of the impacts results from the interaction between the severity of the impacts and the probability of occurrence of these impacts. Severity is defined according to parameters such as the nature, intensity, duration, and extent of the disturbances (impacts) imposed on the significant components of the environment. This evaluation, which is based on the Fecteau matrix (Table 1), comprises different stages. The first consists of determining the nature, intensity, duration, reversibility, and extent of each identified impact. The second step concerns the evaluation of the seriousness or severity or consequence of each impact based on its nature, intensity, duration, reversibility, and extent. The third step is to determine the probability of occurrence of the various impacts. Then, we estimate the significance or criticality of each impact to specify its value and at the end, we record the results of the analysis in the impact assessment summary grid and determination of the components affected or not by the project or facility as well as the magnitude of cumulative impacts of those where uncertainty persists in nature and significance.

Table 1: Significant impact assessment grid (Fecteau)

Intensity	Expension	Duration	Score	Absolute Importance
High (3)	Regional (3)	Long term (3)	9	Major
		Mid-term (2)	8	Major
		Short term (1)	7	Major
	Local (2)	Long term (3)	8	Major
		Mid- term (2)	7	Major
		Short term (1)	6	Medium
	Ponctual (1)	Long term (3)	7	Major
		Mid-term (2)	6	Medium
		Short term (1)	5	Medium
Medium (2)	Regional (3)	Long term (3)	8	Major
		Mid- term (2)	7	Major
		Short term (1)	8	Medium
	Local (2)	Long term (3)	7	Major
		Mid- term (2)	6	Medium
		Short term (1)	7	Medium
	Ponctual (1)	Long term (3)	6	Medium
		Mid- term (2)	5	Medium
		Short term (1)	4	Minor
		Long term (3)	7	Major

Base (1)	Regional (3)	Mid- term (2)	8	Medium
		Short term (1)	7	Medium
	Local (2)	Long term (3)	6	Medium
		Mid- term (2)	7	Medium
		Short term (1)	6	Minor
	Ponctual (1)	Long term (3)	5	Medium
		Mid-term (2)	4	Minor
		Short term (1)	3	Minor

Nature of the measures to be prescribed

Prescriptions and recommendations will be given for each of the environmental impacts identified to diminish, reduce, attenuate, eliminate and prevent the risks incurred by the environmental milieu. These prescriptions can be succinct or exhaustive depending on the complexity of the impact, the recommendations can be applied to the short, medium, or long term and can require more or less significant investments and changes in behavior. These measures are of three kinds. They can be either preventive; intended to prevent or reduce negative impacts in advance, or compensatory; they concern unavoidable impacts. The recommended measures will either restore or replace with similar resources. Finally, these measures can be corrective; actions will be taken to reduce undesirable or unfavorable effects to bring them to an acceptable threshold.

Evaluation of the waste management system

Quantification and analysis of waste

To assess the waste management system, an inventory was first carried out. It was a question of making an inventory of waste management. To do this, we conducted interviews with the maintenance agents and the staff of each department. After this step, an inventory of the different types of waste generated in each service was made and then classified according to their origin.

Then came the quantification of the waste. It provides a general overview of the amount of waste generated. To calculate the daily production of waste, we used a method recommended by the WHO. The latter consists of weighing all the garbage bags before they are emptied and disposed of. The weighing concerns waste from healthcare activities, household waste, and anatomical waste produced in the departments studied. The measurements were taken using a weighing scale (0-100 kg). After the quantification, the

analysis of this waste permitted us to detect the shortcomings relating to the proper management of the waste. However, a few questions put to the hygiene department made it possible to analyze the current waste management.

Identification of the causes of failures related to waste management

The analysis of the current waste management system allows us to look for the causes of the management failures. To do this, the methodology used is the Ishikawa diagram or cause and effect diagram. It is a representation tool. It is also called the cause and effect diagram. It makes it possible to classify the causes related to the mentioned problem. It also makes it possible to limit the forgetting of the causes by the group work, to provide the elements for the study of the solution, and to classify the causes in large families generally the 5M. The Ishikawa diagram (Figure 2) is in the form of a fishbone graph. It is a tree structure visualizing the problem on one side, and its potential causes on the other; the causes being the factors likely to influence the problem and can be grouped classically by families, around 5M. These "5M" in French are Matériel, Milieu, Méthodes, Matière, Main d'oeuvre, in English, Equipment, Environment, Methods, Materials, and Labor (Tatsadjieu, 2016). Finally, we place them on the diagram. We then determine the cause or causes mainly responsible for the problem on which action must be taken.

Labor: causes related to skills, training, and organization;

Equipment: these are causes relating to equipment, machines, etc.

Material: causes relating to the materials used, to the products;

Method: causes related to the way of working;

Environment: causes related to the environment such as geographical location

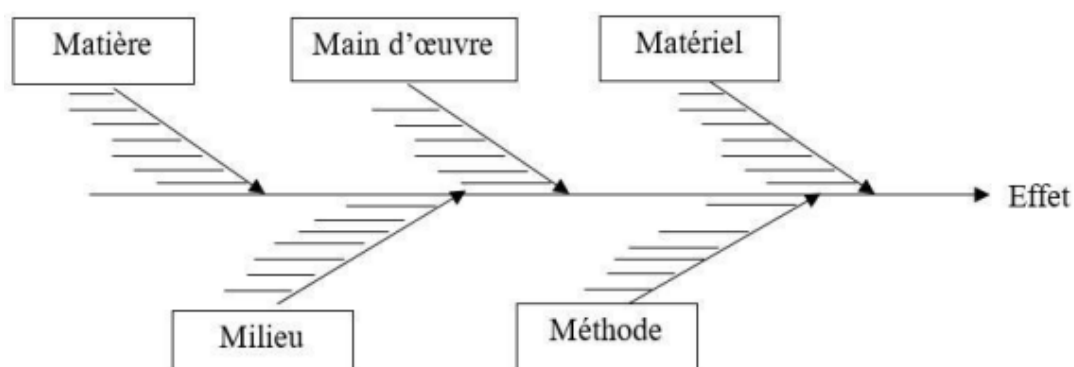


Figure 2: Diagram of Ishikawa

RESULTS

Analysis of environmental impacts

Identification of environmental and social components that are impacted

The impact of the analysis methods used allowed us to identify, characterize and assess the environmental impacts caused by the medical center. Thus, we used the Leopold matrix (Table 2) which is the most often used in this kind of study. It makes it possible to determine the interactions between the activities of the establishment and the components of the environment. In this table, the negative impacts on the environmental components are represented by the “-” sign and the positive ones are represented by the “+” sign.

PHASES	ACTIVITIES/ IMPACT SOURCES	Components of the environment							
		Physical environment			Biological environment		Human environment		
		Are a	Soil	Water	Fauna	Flora	Health	Socio- Economy	Securit y

Exploitation	Waste incineration	—	—	—	—	—	—		—
	Operation of air conditioners	—					—		
	Poor toilet management	—	—	—			—		
	Genset Operation	—					—	+	
	Maintenance of premises (cleaning)	—					+		
	Water management and channeling	—	—	—	—	—	—		
	Vehicle mobility	—	—						

Table 2 : Identification of impacts on the environmental components (Leopold matrix

Characterization, impact assessment and proposal of corrective measures

Impact on air quality

Main sources of air pollution caused by the health center were identified, namely waste incineration, poor management of toilets (actual impact), and the activity of air conditioners and generators (potential impact).

A traditional incinerator is set up on the site where certain wastes such as test tubes, collection boxes, strips, cassettes, Pasteur pipettes, vials, sachets of rapid HIV tests, etc. are incinerated. This incineration, which is practiced twice a month, constitutes a real source of pollution to the atmosphere. The types of atmospheric emissions likely to be released are acid gases, such as Hydrogen Sulfide (H₂S), Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), black smoke, particulate fly ash, Carbon Monoxide (CO), nitrous oxides (NO_x), heavy metals and Volatile Organic Compounds (VOC) which can cause liver, digestive tract and blood cancers. Another real impact of the center on air quality is poor toilet management. The air quality in the toilets is not appreciable because of the narrowness of the latter, added to that the odors due to the absence of water in the toilets for cleaning after each use. These olfactory discomforts also present health risks for both patients and staff.

Operation of the air conditioner and generators: the Medical Center has two five air conditioners and two generators for its operation. Although they are beneficial, they pose potential risks to the environment due to the refrigerants they release in terms of air conditioners. These fluids are responsible for the increase in greenhouse gases. Generating sets, due to poor maintenance, release fumes into nature that can be harmful to the environment and human health.

According to Article 21 of Framework Law 96/12 on environmental management, it is prohibited: To affect the quality of the air or to cause any form of modification of its characteristics likely to harm public health or property; To emit any polluting substance into the air, in particular fumes dust or toxic corrosive or radioactive gases beyond the limits set by the implementing texts of this law, as the case may be, by specific texts; to emit odors which by their concentration or their nature prove to be particularly inconvenient for humans. Within the meaning of this provision of the law, it is clear that the activity of incinerating medical waste at the Madingring Medical Center contributes to emitting polluting and toxic substances into the air, as well as unpleasant odors affecting the air quality and presenting risks to humans. As the structure does not have an environmental permit, this practice of incineration is illegal. Its impact is negative, with direct interaction with the environment. It is local in scope and long-lasting. Its intensity is strong and its importance major.

To reduce emissions of pollutants into the atmosphere contributing to air quality pollution, the Center must cease all forms of incineration within the structure, apply for an environmental permit for the management of medical waste or entrust it to an approved structure against the certificate of destruction. Place barrels or buckets that must permanently contain water at the entrance to the toilets to allow the toilets to be sanitized after use, educate

patients and nurses on the need to flush toilet water after use, and place deodorants both in the toilets and in the most indisposed rooms. To avoid the emission of refrigerants into the air by air conditioners and smoke from generators, entrust their maintenance to approved structures for regular checks.

Impact on soil and water

The floor of the medical center is covered in places, which reduces infiltration. However, activities carried out within the establishment are sources of degradation of the uncovered ground, although negligible. These include chores such as washing dishes, cleaning, and laundry. The water from these activities stagnates due to the lack of good drainage and degrades the soil. To limit this impact, it is recommended that the health center install gutters all along the establishment's external water pipeline.

Within the center, the water used in the examination rooms, whether contaminated or not, is poured into the sinks and reaches the sump, which can contaminate the groundwater table. Wastewater from housework containing chemicals is discharged into the gutter. Other negative aspects identified are consequences of the absence of a policy for saving water and reusing rainwater, the poor layout of certain water pipes, leading to soil degradation, and an increase in hygrometry of the environment at the origin of the development of algae and mosses. To limit or even eliminate these impacts, the center must clean out the water channel drains every week to avoid the development of mosquitoes, properly lay out the water channels located at the back of the building, and collect and entrust the contaminated water chemical products to a structure specialized in the management of hazardous liquid waste. These impacts on water and soil are negative, with direct interaction with the environment, with local scope, and medium duration. Its intensity is strong and therefore of major importance.

In some regions of Cameroon, hospital solid waste is simply dumped in burning pits or even dumped in burning pits or even dumped into the environment without into the environment without any treatment (Ngaroua et al., 2018). To limit the risks, it is sometimes treated with sodium hypochloride for disinfection for disinfection purposes. The liquid waste, on the other hand, is often is often evacuated in gutters or dumped in landfills (Ngaroua, 2018).

Evaluation of the waste management system

Identification of waste produced

Each department within the Center produces specific waste to its activity (Table 3).

Table 3: Category of center waste

Category of waste	Trash bags	Services
Infectious waste	Bandages, gloves, dressings, blood bags, blood-soiled equipment.	Laboratory, Operating room, Vaccination and Maternity
Sharp or prickly waste	Syringes, needles, blade.	Laboratory, Operating Room and Vaccination
Non-hazardous waste similar to household waste	Disposable diapers, parcels, stained plaster, banana peels, peanut peels, blisters and more	Comes from all departments and patients of the Center
Anatomical waste	Placenta, body limbs, skin cell	Operating room and Maternity

Collection and sorting method

All services have bins although the colors are not respected. At the start of the day, the waste from the day before is transported by nurses from the various departments to the corridor where it is placed in garbage buckets with a volume of approximately 60L. There are three, one on the ground floor and two upstairs. Maintenance workers are responsible for transporting them to the final storage location. Corner bins have a lid and black plastic to limit access to insects. About sorting, it was noted that sorting at the source is only respected for sharp and anatomical waste. Household waste and infectious waste (bandages, gloves, dressings, bottles, test tubes, strips, blood bags, blood-soiled equipment, etc.) are put together in communal bins and thrown into HYSACAM bins, which exposes anyone in contact with its waste to nosocomial diseases. We also note the non-respect of the color code system because the waste is packaged in black plastic bags.

Sharp or sharp waste is transported and stored near the incinerator. Anatomical waste such as the placenta is buried in a cemented pit. Household waste is assimilated into the garbage and infectious waste is transported and deposited near the toilets. They stay there for about 72 hours before being transported to the HYSACAM bins. As a consequence, this increases the risk of contamination, leads to the flow of contaminated water due to the putrefaction of organic waste, causes the development of insects and flies, and attracts rodents.

Determination of the causes of deficiencies

The 5M: Material, Environment, Labor, Equipment and Methods or Ishikawa diagram which is a cause and effect diagram (Figure 3) shows the causes of the failures encountered which are grouped and classified according to their origin.

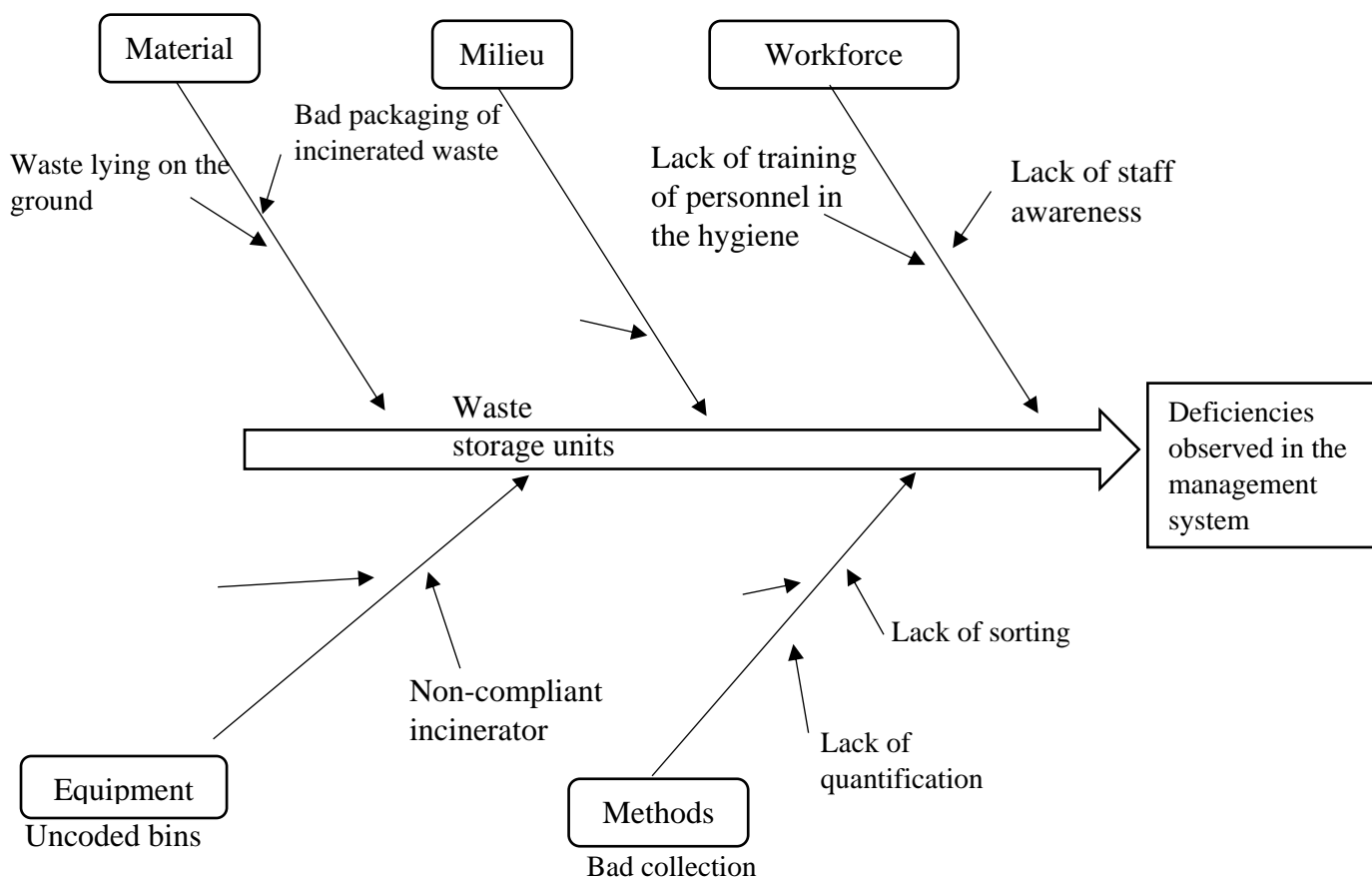


Figure 3: Diagram of the shortcomings of the waste management system

This 5M method allowed us to identify the causes related to poor management (Table 4).

Table 4: Representation of the 5M method

5M	Causes	Impacts	Solutions
Material	<ul style="list-style-type: none"> - Waste lying on the ground; -Bad packaging of incinerated waste. 	Pollution of the soil	Need to set up a storage unit
Environment	Waste storage units	Leachate formation in the plastic bags.	Create a waste storage area.
Workforce	<ul style="list-style-type: none"> - Lack of training of personnel in the hygiene service; -Lack of staff awareness. 	<ul style="list-style-type: none"> - Slowing down of work (increased working time) 	Train and raise awareness of all stakeholders on waste issues.
Methods	<ul style="list-style-type: none"> - Sorting out source; - Lack of quantification of waste; - Lack of procedure for management. 	<ul style="list-style-type: none"> -Contamination of hazardous waste and Not dangerous; - No recycling or reuse of waste. 	Set up specifications for waste monitoring.
Equipment	<ul style="list-style-type: none"> -Non-compliant incinerator - Uncoded bins 	<ul style="list-style-type: none"> -Pollution atmospheric; - Does not facilitate 	-Entrust the waste to a service provider agency;

		sorting.	- Set up the coding system and add work materials.
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Faced with the failure of the medical center's waste management system, we propose an establishment of a hospital waste management program, particularly regarding the methods and conditions of sorting, treatment, handling, storage, transport, and destruction of waste, the exact quantification of hospital waste produced according to a rigorous methodology, to assess the effectiveness of waste management. To do this, it is necessary to draw up a guide to good practice in terms of the hygiene of the Centre and to draw up information sheets on the methods of sorting medical waste according to their dangerousness.

CONCLUSION

The purpose of this work was to assess the environmental impacts and evaluate the waste management system of health facilities, particularly the Madingring District Medical Center. This health center has qualified staff whose main interest is to meet the health care needs of the population. This is done through gynecological consultation, orthopedic consultation, pediatric consultation, ultrasound, dentistry, maternity services, medical analysis laboratory, surgery and general consultation, vaccination, health education, and general Council. However, the operation of this establishment has adverse effects on the environment and human health. The purpose of this study was to assess the impact of activities of this health center on the various components of the environment. To do this, identification, characterization, and evaluation of the impacts was made using the Leopold and Fecteau matrices. The analysis of the waste management system was done using the Ishikawa 5M diagram. It appears that the Center carries out some activities that induce negative impacts on the environment and human health. These include air pollution, water pollution, and soil degradation. Air quality is degraded by the incineration of waste carried out on the site without an environmental permit. Certain activities carried out within the establishment are a source of soil degradation, in particular work such as washing up, cleaning and laundry. The handling of fluids by personnel is also a risk to their health. Economic growth and job creation are positive impacts that have been identified through the payment of taxes and the recruitment of staff. Regarding waste management, it appears that the Center does not have an environmental permit and a waste management plan, the sorting carried out is approximate, hazardous waste is badly incinerated and others are put in landfills, thus exposing the health of populations and polluting the environment. For each impact identified, corrective measures have been proposed and may make it possible to mitigate or eliminate the negative effects and improve the positive aspects, by implementing the environmental specifications. Environmental protection concern everyone. The government is not the only guarantor of the

success of environmental protection measures. Indeed, for the measures proposed in this study to offer visible results, it is essential that each citizen adopts the right actions to reduce environmental degradation. In addition, medical staff should be trained in the best practices and techniques of medical waste management and informed about the dangers of mismanagement of this waste, the regulation of hospital waste management in Cameroon, information and sensitization of users on the social and environmental impacts of environmental degradation, as well as the best practices and behaviors to adopt within health facilities, the use of internal storage bins better adapted for the collection and sorting of waste, the creation of a pre-collection unit of waste within the health centers of Cameroon in general and those of Madingring in particular, etc.

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