

Legal Framework for the Management of Healthcare Activity Waste and the Protection of the Environment from Its Risks under Algerian Legislation

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Abstract:

Like other legal systems, the Algerian legislator has addressed the hazardous waste generated by healthcare activities through a set of laws. It has established classifications for such waste, identified its various types, and regulated the procedures for its management and treatment, leading to its final disposal in order to prevent harm to public health and the environment. It has also designated the institutions responsible for managing this type of waste. However, persistent poor organization and the failure to comply with the legislator's objectives aimed at reducing the risks associated with such waste often result in the recurrence of the same environmental problems, as these wastes re-emerge and become even more hazardous, thereby posing a direct threat to human health. Therefore, it is necessary to develop more effective and preventive mechanisms by activating various monitoring and control mechanisms, with the aim of eliminating the randomness and lack of proper organization characterizing the treatment of waste generated by healthcare activities.

Keywords: Hazardous Waste, Healthcare Activities, Public Health, Waste Treatment.

INTRODUCTION

The environment has become a matter of concern for the entire world as a result of the increasing number and diversity of environmental problems. Various media outlets have contributed to mobilizing global public opinion regarding environmental degradation and the threats posed to human life. Consequently, environmental issues have shifted from the national level to the global level. This is evidenced by the fact that numerous countries and specialized organizations have sounded the alarm over the negative impacts to which the environment is being subjected as a result of harmful human activities. The environment as a whole has thus become vulnerable to undesirable and negative changes and deterioration. This situation prompted most countries of the world to meet officially for the first time at the Stockholm Conference, held in Sweden in 1972 at the invitation of the United Nations General Assembly under the slogan **We Have Only One Earth**. The conference, known as the United Nations

Conference on the Human Environment, was held to discuss the state to which the natural environment had deteriorated and to examine appropriate strategies for its protection. Subsequently, numerous conferences were held, declaring that the planet Earth is at risk as a result of environmental pollution caused by hazardous substances and waste, which constitutes one of the threats to the environment, if not the most significant of them. Accordingly, concern for the environment and its various issues has today become one of the major and controversial topics occupying a prominent position on the agendas of political decision-makers in all countries of the world, whether developed or developing, particularly after the extent of pollution affecting the environment and its various components across the globe became apparent. Pollution caused by hazardous substances and waste in their various forms has also become the greatest threat to the environment and is no longer confined by specific boundaries, as evidenced by the fact that there is no region that has been spared from it and its severe harmful effects.

On this basis, the environment and human health have undergone continuous and persistent deterioration due to the increasing quantities of hazardous waste generated by industrial institutions in general and hospitals and healthcare facilities in particular. Given the dangerous nature of this waste, it has been classified as toxic and hazardous waste. Pollution caused by healthcare activity waste is one of the major problems affecting the environment, and this problem is increasing day by day as a result of the growing production of such materials. Consequently, the issue of transporting this type of hazardous waste and disposing of it across national borders has become one of the most significant environmental challenges facing the world in the twenty-first century, given the serious risks that this issue poses to human health and the environment.

This research derives its significance from the fact that it serves as a reflection of the development of societies and states, as it has attracted the attention of specialists as well as citizens. This topic is also of considerable importance due to its negative and irrational impacts on the human environment, which has continued, and continues, to destroy and devastate ecosystems. What makes matters even worse is that human beings cannot dispense with medical care under any circumstances, as they may suffer from a particular illness that requires them to visit hospitals and receive treatment with medications, accompanied by various medical procedures and laboratory tests. This has caused humanity to suffer silently, while the extent of what remains hidden may be even greater.

After examining the main aspects of the topic, we decided to formulate the following research problem:

What is meant by healthcare activity waste, and what is the impact of pollution on the environment from an international and national perspective?

To address the research problem raised, we adopted a two-part structure, which is organized as follows:

In the first part of this study, we discuss the general framework of healthcare activity waste. The second part is devoted to examining the serious effects resulting from healthcare activity waste, as well as the various mechanisms capable of reducing these effects, which result in the emission of hazardous and infectious chemical substances.

In studying this topic, we primarily relied on the analytical method and on an examination of the current state of the environment.

1. General Framework of Healthcare Activity Waste

Healthcare activity waste is a sensitive issue closely associated with environmental pollution, particularly when it is not disposed of carefully and rationally. Accordingly, various national and international legislations have classified it among the hazardous materials that pose risks to both human beings and the environment. On this basis, it is appropriate to shed light on what is meant by healthcare activity waste by defining it, identifying its categories, and examining the various effects resulting from healthcare activity waste. These issues will be addressed through the following sections:

1.1 The Concept of Healthcare Activity Waste

We will examine healthcare activity waste by defining it from a terminological perspective, as well as presenting the views of legal scholars and the Algerian legislator. On the other hand, we will also highlight the international definition of healthcare activity waste and then proceed to identify its categories.

1.1.1 Definition of Healthcare Activity Waste

The Algerian legislator has accorded healthcare activity waste particular importance, considering that it is classified among the hazardous materials that cause serious harm to both human health and the environment. To gain a better understanding of this type of waste, it is appropriate to examine it through the following points:

A. The Terminological Definition of Healthcare Activity Waste

Legal scholars have differed in providing a unified definition of healthcare activity waste. The term healthcare activity waste or medical waste refers to all waste generated by healthcare facilities, that is, waste resulting from their activities and operations. It therefore includes waste generated by medical practices. The main sources of this waste are hospitals, health centers, laboratories, blood banks, and morgues. By contrast, doctors' and dentists' clinics, pharmacies, and home healthcare services generate smaller quantities of medical waste. From this, it can be inferred that the second category of medical activities does not cause significant harm to the environment and its surroundings¹.

B. Definition of Healthcare Activity Waste by the Algerian Legislator

The concept of healthcare activity waste is addressed in Algerian Law No. 01-19 concerning the management, treatment, control, and disposal of waste, specifically in Article 3, paragraph 7, which stipulates that: Healthcare activity waste means all waste resulting from examination, monitoring, preventive treatment, or therapeutic activities in the fields of human and veterinary medicine².

C. The International Definition of Healthcare Activity Waste

The World Health Organization defines it as waste generated by facilities providing various healthcare services, laboratories, pharmaceutical and medicinal product and vaccine

1- Soualem Sofiane, *Research on Tort Civil Liability for Healthcare Activity Waste under Algerian Legislation*, p. 200.

2- Law No. 01-19 concerning the Management, Treatment, Control, and Disposal of Waste, dated December 12, 2001.

production centers, veterinary treatment centers, research institutions, and home-based treatment and nursing³.

The Unified System for the Management of Healthcare Waste of the Cooperation Council for the Arab States of the Gulf likewise defines it as waste generated by facilities providing various healthcare services, laboratories, pharmaceutical and medicinal product and vaccine production centers, veterinary treatment centers, research institutions, and home-based treatment and nursing⁴.

1.1.2 Classification of Healthcare Activity Waste

Algerian legislation has addressed hazardous healthcare waste and classified it in more than one way, whether at the legislative level, according to the authority responsible for regulating healthcare waste through decisions and decrees, or at the international level, based on the circulars and laws of organizations and conventions concerned with health and environmental issues. In this section, we will examine the classification of this type of waste from the perspective of Algerian legislation and international law.

A. Classification of Healthcare Activity Waste under Algerian Legislation

With reference to Executive Decree No. 03-478 of December 9, 2003, concerning the determination of the procedures for managing healthcare service waste, we find that the decree classified this type of hazardous healthcare waste into three categories:

- **Waste consisting of human anatomical parts:** Human anatomical waste includes all products resulting from human tissue removal procedures performed in operating rooms and delivery rooms, as well as all tissues and body organs that have been surgically removed, amputated limbs, stillborn fetuses, and various bodily fluids such as blood and other secretions produced by the human body. This waste is also referred to as anatomical waste.

The responsibility for disposing of this type of healthcare waste falls on the institution responsible for generating it, as stipulated in Article 3 of the Joint Ministerial Order of April 4, 2011, concerning the procedures for treating waste consisting of human anatomical parts. No healthcare institution that generates this type of healthcare waste may store it for more than four weeks. The storage process itself is also subject to strict conditions stipulated in Articles 10 and 11 of the aforementioned Joint Ministerial Order⁵.

- **Infectious waste:** This refers to waste capable of transmitting infectious diseases as a result of contamination by bacteria, viruses, parasites, and fungi. It contains microscopic or microbial components that may pose a threat to public health due to their transmission through direct contact or through the air. The Joint Ministerial Order further states that the degree of infectiousness and the likelihood that microorganisms

3- Mohammed Ben Ali Al-Zahrani, Fayed Abu Al-Jadayel, *Sustainable Management of Medical Waste in the Arab World*, Third Arab Conference on Environmental Management, Sharm El-Sheikh, Egypt, November 23–25, 2004.

4- Abbas Zakaria, Berahmani Mahfoud, Financial Mechanisms for Reducing the Harm Caused by Healthcare Activity Waste (Compensation for Damage and Environmental Fees), *Al-Risala Journal for Human Studies and Research*, Vol. 07, No. 07, 2022, p. 43.

5- Abbas Zakaria, Berahmani Mahfoud, *op. cit.*, pp. 45–46.

contained in infectious waste will remain viable are particularly high when certain conditions are present, such as suitable temperatures and nutrient-rich fluids⁶.

- **Toxic waste:** Article 10 of Executive Decree No. 03-478 of December 9, 2003, concerning the determination of the procedures for managing healthcare service waste, defines toxic waste as all waste resulting from expired materials used in the pharmaceutical, chemical, or laboratory fields. It also includes waste containing high concentrations of heavy metals, as well as acids and used oils.

It can be observed from this provision that this type of toxic waste is highly hazardous, both from a health and an environmental perspective. The legislator has therefore established specific conditions governing its handling⁷.

1.2 General Effects Resulting from Healthcare Activity Waste

Exposure to pollution caused by healthcare activity waste entails significant risks to humans and the environment, which may sometimes be difficult to avoid, given that such waste contains infectious, toxic, and radioactive hazardous substances. Accordingly, the severity of these effects may vary depending on the level of danger and the type of entity exposed to this waste, as well as due to failure to comply with proper procedures when handling household waste. In 2000, the World Health Organization conducted an assessment in 00 countries, which showed that most healthcare facilities did not adopt proper methods for disposing of healthcare waste. This results in numerous health effects, in addition to various environmental risks, which will be addressed in the following sections:

1.2.1 Health Effects Resulting from Healthcare Waste

Healthcare waste has serious consequences for human health, and the severity of the risks associated with such waste varies. These risks may be transmitted through contaminated blood or by inhaling air containing waste composed of particles from contaminated human organs, or through contact with healthcare waste contaminated with bacteria and parasites. In some cases, healthcare waste may also be ingested, thereby affecting the human body.

The various health hazards and serious effects of healthcare waste can be summarized as the risk of poisoning and the risk of infection⁸.

1.2.2 Environmental Effects Resulting from Healthcare Activity Waste

This type of waste causes highly serious damage to the environment in general and to ecosystems in particular. Healthcare activity waste can spread and move rapidly and easily from one area to another, thereby affecting environmental components, particularly air, water,

6- Ibid, p. 46.

7- Sarai Oum El Saad, *The Role of Health Administration in the Effective Management of Medical Waste within the Framework of Sustainable Development Regulations – An Application to an Algerian Hospital Institution*, Graduation Thesis Submitted in Partial Fulfillment of the Requirements for a Master's Degree in Economic Sciences, Specialization in Strategic Business Management for Sustainable Development, Ferhat Abbas University, Sétif, 2009/2010, p. 02.

8- Abbas Zakaria, Berahmani Mahfoud, *op. cit.*, p. 84.

and soil. Its effects may also extend to the aesthetic quality of the environment, particularly when such waste is directly released into environmental media without treatment⁹.

Accordingly, healthcare activity waste has become a major source of concern at both the national and global levels because of its long-term effects on the various components of the environment. When healthcare activity waste is improperly disposed of in the environment, the hazardous emissions from the substances it contains may cause harm through the release of toxic gases such as mercury, chlorine gas, and carbon monoxide, in addition to the harmful effects of smoke and volatile impurities. This may lead to air pollution when such waste is disposed of through uncontrolled burning, for example. Similarly, improper or non-engineered landfilling or burial may result in contamination of groundwater reserves and soil pollution¹⁰.

2. Mechanisms for the Sorting and Treatment of Healthcare Activity Waste

The mechanisms for sorting and treating healthcare activity waste are addressed by first discussing, in the first section, how waste generated by healthcare activities is sorted, and then, in the second section, examining the methods used for its treatment.

2.1 Sorting and Storage of Healthcare Activity Waste

The Algerian legislator, through Executive Decree No. 03-478, requires in Article 13 that healthcare activity waste be sorted at its source. Such waste may not be mixed with household waste or similar waste, nor may different categories of healthcare activity waste be mixed with one another. Sorting is carried out using the following methods.

2.1.1 Color-Coded Sorting

Sorting is the process of separating different categories of waste according to their nature at the point of generation. Articles 13 and 14 of Executive Decree No. 03-478 prohibit the accumulation of healthcare activity waste and require it to be sorted at its source¹¹. Each category must then follow its own disposal pathway. The sorting process has several benefits, the most important of which are maintaining public health and safety and reducing the quantity of healthcare activity waste. Waste generated by healthcare institutions is therefore sorted according to its categories and packaged in accordance with applicable international and national standards. Accordingly, at the national level in Algeria, waste is divided into four categories and packaged as follows:

- Infectious waste is placed in yellow bags or in containers designated for infectious, sharps, or cutting waste.
- Anatomical waste is placed in green bags.
- Toxic waste is placed in red bags.
- Non-hazardous household-like waste is placed in black bags¹².

This is also provided for in Articles 6, 9, and 11 of Executive Decree No. 03-478, which stipulate that waste consisting of human anatomical parts must be placed in single-use plastic bags with a thickness of no less than 0.1 mm, which are resistant and durable and prevent

9- Haidar Muhammad Majid Hussein Al-Husseini, *Medical Waste and Its Environmental Impacts in the City of Karbala*, Part of the Requirements for a Master's Degree in Geography, 2012, p. 40.

10- Abbas Zakaria, Berahmani Mahfoud, *op. cit.*, p. 20.

11- Articles 13 and 14 of Executive Decree No. 03-478.

12- Mohamed El Amine Fellali, Khaled Boujadar, Generation and Management of Healthcare Institution Waste: A Comparative Study of Algeria and Some Arab Countries, *Journal of Human Sciences*, Vol. 27, No. 03, p. 525, December 2016.

chlorine from leaking during burial. Toxic waste must be placed in red plastic bags subject to the same conditions as bags used for infectious waste, with disinfectant substances placed inside them¹³.

2.1.2 Collection and Storage of Healthcare Activity Waste

After the sorting of healthcare activity waste has been completed, the process proceeds to the storage stage, which consists of two phases: temporary storage and central storage. Waste collection is defined as the process of gathering and collecting waste for the purpose of transporting it to the location where it will be treated¹⁴.

A. Temporary Storage

After the sorting process has been completed and once the bag or container designated for healthcare activity waste is full, the waste is transferred to temporary storage rooms. It is transported using specially designated carts. These rooms must be located outside, but close to, the medical department concerned with the waste. They must be exposed to direct sunlight and must have adequate lighting and ventilation. The Algerian legislator has established specifications for storage facilities, requiring them to be exclusively dedicated to waste and to have adequate ventilation, lighting, and water supplies, as well as drainage outlets, with regular cleaning and strict security measures to prevent unauthorized persons from entering¹⁵.

B. Central Storage

After the temporary storage stage has been completed, the process moves to the central storage stage. The carts used for temporary storage are transported to the central storage room, accompanied by a number of preventive measures, such as the requirement not to use the same elevators designated for patients and visitors. In addition, central storage facilities must meet several conditions that healthcare institutions are required to observe, including easy access for vehicles transporting healthcare activity waste and easy exit from the facility. The walls and floors must be smooth, water-resistant, and easy to clean, and the facility must be equipped with a water supply and a sewage system, in addition to adequate ventilation and protective covers for all openings to prevent the entry of insects and rodents. The facility should also be located near the area designated for cleaning and disinfecting the carts. The storage facility itself must be disinfected weekly and after any leakage occurs¹⁶.

According to Executive Decree No. 22-274, specifically Article 2, the storage period for healthcare activity waste in collection facilities, prior to its removal for treatment, must not

13- Mokhtari Mohamed Irchad Eddine, *Medical Waste Management under Algerian Legislation*, Master's Thesis submitted in partial fulfillment of the requirements for a Master's Degree in Law, Specialization in State and Institutions, Faculty of Law and Political Science, Ziane Achour University of Djelfa, Academic Year 2019/2020, p. 52.

14- Article 3 of Law No. 01-19 of 27 Ramadan 1422 AH, corresponding to December 12, 2001, concerning the management, control, and disposal of waste, *Official Gazette*, No. 77, dated 30 Ramadan 1422 AH, corresponding to December 15, 2001.

15- Articles 18, 19, and 20 of Executive Decree No. 03-478, op. cit.

16- Messaoudi Youssef, Amel Kadri, Laboratory of Law and Society, Treatment of Healthcare Activities between Legislation and Practice, *Journal of Scientific Research in Environmental Legislation*, No. 8, p. 308, January 2017.

exceed twenty-four (24) hours for healthcare institutions equipped with an incinerator and forty-eight (48) hours for healthcare institutions that do not have an incinerator¹⁷.

2.2 Treatment of Healthcare Activity Waste

The Algerian legislator addressed the waste treatment system in general through Law No. 01-19 under the heading:

Rational Environmental Management of Waste¹⁸.

This provision encompasses the recovery, storage, and final disposal of waste, with the aim of preserving public health and containing the effects resulting from the harm caused by such waste.

Waste treatment also refers to the practical procedures that allow waste to be recovered, stored, and disposed of in a manner that ensures the protection of public and environmental health from the harmful effects that such waste may cause¹⁹. In the following two subsections, we will examine the Algerian legislator's approach to the treatment of healthcare activity waste by addressing the methods used to treat it, as well as the specifications governing its treatment.

2.2.1 Methods for Treating Healthcare Activity Waste

Treatment here refers to a process designed to alter the biological characteristics or biological composition of waste generated by healthcare activities in order to reduce or eliminate the pathogenic organisms contained therein, so that the waste no longer poses a risk to public health and can subsequently be safely disposed of in a municipal sanitary landfill. An exception is made for incinerator ash, which may possess hazardous characteristics. The treatment of medical waste must ultimately result in its sterilization and the destruction of all forms of microbial life contained therein, including viruses and bacteria²⁰.

The Algerian legislator established procedures for treating healthcare activity waste through Executive Decree No. 03-478. Article 22 thereof provides that the procedures for treating waste consisting of human anatomical parts shall be determined by a joint decision of the ministers responsible for the environment, health, and religious affairs. Toxic waste, pursuant to Article 23, is treated under the same conditions applicable to special waste of the same nature, in accordance with the applicable regulatory framework. Infectious healthcare activity waste must be incinerated pursuant to Article 24²¹. The methods for treating healthcare activity waste include the following:

- Landfilling of medical waste.
- Moist-heat sterilization.
- Dry-heat sterilization.
- Disposal through encapsulation.
- Geological isolation.
- Disposal through deep wells.
- Recycling.

17- Mansour Medjadji, The Legal System for the Management of Medical Waste in Algeria, *Al-Mi'yar Journal*, Vol. 23, No. 47, p. 558, 2019.

18- Article 3 of Law No. 01-19 concerning the management, control, and disposal of waste.

19- Mohamed El Amine Fellali, Khaled Boujadar, op. cit., p. 525.

20- Imad Farhat, Medical Waste, *Environment and Development Journal*, Abu Dhabi, January 2001, No. 34, p. 2.

21- Articles 22, 23, and 24 of Executive Decree No. 03-478.

- Stabilization methods.
- Distillation.
- Filtration.
- Chemical disinfection.
- Irradiation.
- Incineration²².

2.2.2 Specifications Related to the Treatment of Healthcare Activity Waste

With reference to Executive Decree No. 03-478, the specifications governing treatment are determined according to the type of waste, as follows:

- The procedures for treating waste consisting of human anatomical parts must be determined.
- Toxic waste must be treated under the same conditions applicable to special waste of the same nature.
- Infectious medical waste must be incinerated.
- Infectious healthcare activity waste must be incinerated within the healthcare institution if the latter has an incinerator. If the incineration facility is located outside the healthcare institution, the following requirements must be met:
 - ✓ An incinerator serving several healthcare institutions.
 - ✓ An incineration facility belonging to an institution specialized in waste treatment and legally authorized to treat healthcare activity waste.
- The facility must be subject to authorization in accordance with the provisions of Article 42 of Law No. 01-19²³.
- The healthcare institution shall bear the costs of treating the healthcare activity waste it generates.
- Waste and residues resulting from incineration facilities must be disposed of in accordance with the provisions of Law No. 01-19.
- Personnel responsible for collecting, transporting, and treating healthcare activity waste must be provided with various protective measures against needlestick injuries and other wounds they may encounter. They must also be informed of the various risks that may arise from handling such waste and must receive appropriate training before handling it²⁴.

CONCLUSION

If this study must be brought to a close with a concluding statement, the most appropriate approach is to present the main findings and recommendations reached, which are set out as follows:

22- Messaoudi Youssef, Amel Kadri, op. cit., pp. 311–312.

23- Article 42 of Law No. 01-19 concerning the management, control, and disposal of waste, op. cit.

24- Mansour Medjadji, op. cit., p. 559.

Findings:

- The issue of waste in general, and healthcare activity waste in particular, has received considerable attention from the Algerian legislator, as reflected in numerous laws and executive decrees that have addressed and sought to tackle this contemporary problem.
- Proper management of healthcare activity waste is of great importance when it is based on effective planning and management.
- Insufficient consideration of the environmental dimension fails to ensure a safe and clean environment free from the risks arising from healthcare activity waste.
- If healthcare activity waste is not properly handled, whether at the point of generation or during its handling, transportation, and disposal, through strict compliance with local legislation and laws, the environment will be exposed to endless problems.
- The more effective the waste-sorting system is, the easier it becomes to dispose of waste without causing serious harm to the environment and ecosystems.

Recommendations:

- Activate environmental taxation for every hospital or healthcare institution that violates laws aimed at protecting the environment by imposing the maximum financial penalties in the form of environmental fees and taxes, in application of the polluter-pays principle stipulated in Law No. 03-10 concerning the Protection of the Environment within the Framework of Sustainable Development.
- Work to provide the most appropriate methods for disposing of healthcare activity waste at its source by creating and developing smart technologies that contribute to reducing the generation of such waste.
- Provide local authorities with sufficient material resources to ensure successful and effective waste management.
- Organize awareness campaigns and training sessions at medical centers, given the sensitivity of this field, in order to raise awareness of the risks associated with waste in general and healthcare activity waste in particular, as this field is closely connected to both human beings and the environment.
- Work to strengthen the role of the media in addressing this issue, as it serves as a link between the relevant authorities, citizens, and the environment.

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