

# Sociology of Health and the Environment: The Management of Infectious Medical Waste at the University Hospital (CHU) of Abidjan/Cocody, from Sorting to Incineration, Côte D'ivoire

Kobenan Yao Innocent<sup>1\*</sup>; Sinan Adaman<sup>2</sup>

<sup>\*1</sup>Doctoral Candidate, Environmental Sociology, Department of Sociology, UFR of Social Sciences, University Peleforo Gon Coulibaly of Korhogo (Côte d'Ivoire)

<sup>2</sup>Lecturer-Researcher, Department of Sociology, UFR of Social Sciences, University Peleforo Gon Coulibaly of Korhogo (Côte d'Ivoire)

\*Corresponding Author

Received:- 01 December 2025/ Revised:- 06 December 2025/ Accepted:- 17 December 2025/ Published: 31-12-2025  
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**Abstract**— *This study aims to draw the attention of actors involved in the management of infectious medical waste to the potential risks posed to human health and the environment. Cocody University Hospital (CHU de Cocody), due to its central role in the healthcare system, was selected as the research site. To achieve the study's objectives, scientific literature and results from field surveys were mobilized. Our investigations show that the informal and inadequate management of hospital waste at the CHU of Cocody is strongly linked to the neglect of established standards issued by the Ministry of Health as well as socioeconomic constraints. Waste sorting, which should be performed at the source by healthcare staff, is frequently bypassed. This failure greatly complicates the management of infectious medical waste. The repeated breakdowns of the incinerator are largely due to improper sorting practices, resulting in some infectious waste being diverted to landfills. Such waste becomes a source of contamination for soil, air, and both surface and groundwater, posing serious risks to all individuals exposed to it. The research highlights how social actors develop strategies that operate outside formal norms to meet their own interests.*

**Keywords**— *hospital waste, health policy, dysfunction.*

## I. INTRODUCTION

The Ivorian population, or more precisely the resident population as defined in the General Population and Housing Census (RGPH), increased from 6,709,600 inhabitants in 1975 to 29,389,150 inhabitants in 2021. This represents a significant demographic expansion over a span of fifty years. Regarding the use of healthcare services, the national rate of access to health facilities rose from 67% in 2016 to 70.17% in 2020. This increase, attributed to improved technical capacities in healthcare facilities, led to a higher number of patient visits. Combined with numerous health interventions, including vaccination campaigns, the result is a substantial rise in the production of medical waste.

The management of this waste—estimated at 25.55 tons of solid waste per day, or approximately 9,325.09 tons annually—is a major public health and environmental concern. Poor sorting practices persist, with 38% of public institutions failing to separate waste at the source. This elevates the proportion of infectious, sharp, and hazardous waste.

Healthcare facilities have recently benefited from rehabilitation and equipment upgrades through a large five-year program (2016–2020) implemented by the Government and its international partners. The Ivorian health system, like many others globally, is mixed and pluralistic, comprising both public and private actors. According to the 2020 National Health Statistical Survey (RASS), Côte d'Ivoire has 3,831 healthcare facilities, with 60% belonging to the public sector and 40% to the private sector.

The healthcare system is structured into three levels—primary, secondary, and tertiary—organized in a pyramidal form. Cocody University Hospital, a key component of the tertiary level, was chosen as the research site. This study aims to raise awareness among actors responsible for infectious medical waste management regarding the risks such waste poses to human health and the environment. Scientific literature and survey data were used to formulate recommendations.

## II. BRIEF OVERVIEW OF THE IVORIAN HEALTH SYSTEM

The Ivorian healthcare system is organized into three levels:

### 2.1 Primary Level:

This level serves as the entry point into the health system. It includes facilities offering curative, preventive, educational, and promotional services. These include:

- Rural Dispensaries (DR)
- Rural Health Centers (CSR)
- Urban Health Centers (CSU)
- Specialized Urban Health Centers (CSUS)
- Urban Health Training Centers (FSU)

### 2.2 Secondary Level:

This level supports the primary level by providing enhanced diagnostic and treatment capacity. Facilities include:

- General Hospitals (GH)
- Regional Hospital Centers (RHC)
- Specialized Hospital Centers (SHC) without National Public Establishment (EPN) status

### 2.3 Tertiary Level:

This level provides specialized care and advanced diagnostic, treatment, training, and research capabilities. It includes:

- University Hospital Centers (CHU)
- Abidjan Cardiology Institute (ICA)
- Raoul Follereau Institute (IRFCI)
- National Public Hygiene Institute (INHP)
- National Blood Transfusion Center (CNTS)
- National Public Health Laboratory (LNSP)
- National Institute of Public Health (INSP)
- Alassane Ouattara National Oncology and Radiotherapy Center (CNRAO)
- Emergency Medical Assistance Service (SAMU)
- National Center for the Prevention and Treatment of Renal Failure (CNPTIR)

Cocody University Hospital, a major tertiary-level facility, was chosen for this study because of its high production of biomedical waste and its critical place in the national healthcare infrastructure.

## III. NATIONAL AND INTERNATIONAL REGULATIONS

Multiple documents govern health and environmental policies in Côte d'Ivoire. Law No. 2023-900 of November 23, 2023 (Environmental Code) reinforces environmental protection for sustainable development and guarantees citizens an ecologically balanced living environment. The law applies to all forms of pollution and covers installations that may pose risks to public health, environmental quality, safety, or public order.

It prohibits:

- dumping, incineration, or discharge of harmful substances into maritime waters under Ivorian jurisdiction
- unauthorized importation or dumping of waste

- disposal of waste in lagoon, continental, or maritime waters

Decree No. 131/MSHP/CAB/DGHP/DRHP of June 3, 2009 regulates medical waste management. It classifies medical waste into three categories:

1. Category 1: household-like waste
2. Category 2: infectious medical waste
3. Category 3: non-infectious medical waste

Medical waste in Categories 2 and 3 must be treated primarily by incineration.

The 2009 National Policy on Injection Safety and Medical Waste Management reaffirms Côte d'Ivoire's commitment to ensuring injection safety and environmentally sound waste management in both public and private sectors. Solid waste must be incinerated or disposed of safely, and liquid waste must be treated before discharge.

#### **IV. MATERIALS AND METHODS**

##### **4.1 Study Site:**

The study was conducted in the Abidjan District, specifically at the Cocody University Hospital. Given its size and role, this facility is a major producer of biomedical waste.

##### **4.2 Population:**

The study population consists of:

- medical staff
- administrative staff
- technical staff involved in waste collection and disposal (SEQUOIA, NETSI)
- ELTSON incineration staff

##### **4.3 Inclusion Criteria:**

Individuals working in the hospital or in the companies SEQUOIA, NETSI, or ELTSON who were present during data collection.

##### **4.4 Exclusion Criteria:**

Eligible individuals absent during data collection.

##### **4.5 Type of Study:**

This is an exploratory and descriptive study aimed at identifying waste management problems at the CHU and proposing solutions. Both quantitative and qualitative variables were collected between December 4, 2024 and April 10, 2025.

##### **4.6 Material:**

Data were collected using:

- questionnaires with open and closed questions
- interview guides for qualitative input
- infographics
- covert and participant observation

##### **4.7 Sample:**

A random sampling method was used. Seventy-one (71) individuals participated in the survey.

**TABLE 1**  
**DISTRIBUTION OF RESPONDENTS BY DEPARTMENT**

University Hospital Staff						Technical Maintenance Staff			
Administrative		Medical (A)		Medical (B)		SEQUOIA		NETSI	
V.A	V.R (%)	V.A	V.R (%)	V.A	V.R (%)	V.A	V.R (%)	V.A	V.R (%)
3	4.22%	11	15.49%	7	9.86%	20	28.17%	30	42.25%

(V.A) Absolute value \*\* (V.R) Relative value

## V. RESULTS

The objective of this study is to contribute to improving the overall management of medical waste at the University Hospital Center (CHU) and, more broadly, to extend these recommendations to other healthcare establishments and related institutions in Côte d'Ivoire. To achieve this, the findings summarize and interpret the responses collected during our investigation.

### 5.1 Data Analysis and Interpretation:

#### 5.1.1 Collection of Sharp, Cutting, and Piercing Objects (OPCT):



**PHOTO 1: A safety box for sharp, cutting, and piercing objects (OCPT)**



**PHOTO 2: A full and overflowing safety box in the group emergency department**

*Source: Our investigation, 2024*

Photo 1 presents the designated container used for sharp objects, including used syringes, scalpel blades, and intravenous needles. These containers are provided by the hygiene department, while private cleaning companies supply color-coded bags for overall waste management and handle their collection once full. Each waste type is assigned a disposal container at the point of generation and must be filled only up to three-quarters of its capacity, marked by a red line (see Photo 1).

However, observations at the CHU revealed that healthcare personnel frequently exceed the recommended fill level. Overfilling the sharps containers exposes waste handlers to significant risks. A syringe may fall during handling and cause accidental injury, as illustrated in Photo 2.

This concern was confirmed by Respondent #7, a maintenance and sanitation worker, who stated:

“Once, while collecting these sharps containers, a syringe fell on my foot, and I had to go see the referring doctor, who put me on antiretroviral therapy. Luckily for me, the syringe wasn’t contaminated with HIV. Our work here is really complicated because the healthcare staff doesn’t make it easy for us.”

This testimony highlights the occupational hazards faced by personnel responsible for collecting and transporting sharps containers, particularly the risk of accidental needlestick injuries.

### 5.1.2 Collection of Soft Infectious Medical Waste (Excluding OPCT):



**PHOTO 3: Failure to comply with source separation**

*Source: Our investigation, 2024*

Photo 3 shows a complete IV set, including the fluid bag, tubing, and injection lines. This type of waste falls under the category of soft infectious medical waste and should therefore be disposed of exclusively in yellow bag-type containers. Despite the availability of appropriate yellow containers, healthcare staff were observed discarding such hazardous waste into black bag-type containers intended for household or similar waste.

This behavior indicates poor compliance with waste segregation guidelines and suggests a lack of enforcement. Respondents confirmed this through statements such as:

“When I'm working, I don't sort the waste because I don't have the time; the workload is too heavy.”  
 “Since I've been here, I only put sharp, cutting, and piercing objects in the safety containers; otherwise, everything else gets mixed in. There's no time for that.”

This non-compliance poses serious risks. Workers transporting mixed waste can be exposed to needlestick injuries or other hazards due to improper segregation. One interviewed worker confirmed having suffered such an injury and receiving occupational health follow-up.

In summary, source separation of medical waste is not being respected. Hazardous infectious waste is often found in black bag containers and vice versa. Such practices increase the risk of injury and infection among waste handlers. These preventable incidents emphasize the need for strict adherence to proper waste segregation and packaging procedures.

## 5.2 Waste Quantification:

### 5.2.1 Waste Quantification and Analysis:

**TABLE 2**  
**FREQUENCY OF COLLECTION AND DISPOSAL OF INFECTIOUS WASTE**

Activities	January to March	Satisfaction rate
Collections Household waste	Irregular	0.75
Destruction Infectious Waste	Regular	0.95

*Source: Semi-annual activity report of the hygiene department, 2025*

The table shows the frequency of household waste collection and infectious waste disposal at the CHU. Household waste is collected by the municipality, while infectious waste is incinerated by the service provider ELSTON at the CHU Cocody site.

During the three-month assessment period, significant challenges were identified. These included repeated breakdowns of the incinerator and delays by the municipal service in collecting household and similar waste, resulting in waste accumulation at the facility.

### 5.2.2 Waste Removal:



**PHOTO 4: Temporary Waste Storage Area at the Cocody University Hospital**

*Source: Our investigation, 2024*

The photograph shows the temporary waste storage area where all waste types are mixed together without separation. Proper storage requires designated compartments for each waste category to avoid contamination. At the entrance to this area, damaged safety containers and scattered syringes are visible, creating a hazardous environment for workers handling the waste.

This accumulation is primarily caused by repeated incinerator breakdowns and the municipality's failure to collect household and similar waste on schedule. The absence of proper waste sorting at earlier stages exacerbates the contamination and operational challenges.

According to an incinerator worker with 20 years of experience:

“We destroy what we can; the rest goes to the landfill because we have no choice. The repeated breakdowns of the incinerators and the healthcare staff's failure to sort waste make incineration very complicated, and the volume of infectious waste is increasing. So, Mr. Boss, we do what we can.”

This statement confirms that some infectious waste ends up in public landfills—a violation of waste management regulations—due to equipment failures and inadequate sorting of waste at the source.

## 5.3 Obstacles Related to Waste Removal:

### 5.3.1 Organizational Constraints:

Waste removal at the facility occurs in two stages:

1. Transport from hospital services to the central landfill (incineration site)
2. Transport from the incineration site to the municipal public landfill for household and similar waste

Multiple obstacles arise during both stages. During internal transport, the lack of adequate garbage bags hinders proper packaging. Poor source segregation exposes sanitation workers to bloodborne infection risks. The shortage of appropriate transport containers forces some workers to carry waste manually, increasing their risk of needlestick injuries. Additionally, inconsistent collection schedules disrupt hospital services.

During external transport, only household and similar waste should reach the public landfill. However, due to improper segregation, infectious waste is mixed with non-infectious waste at the dump and transported together. Repeated incinerator breakdowns worsen this issue by leaving untreated infectious waste that must be relocated.

### 5.3.2 Economic Constraints:

The budget allocated for waste collection is 1,600,000 CFA francs per month, while the operational budget for the hospital remains fixed at 1,100,000 CFA francs per month. The expansion of the hospital—particularly the construction of the pediatric gynecology-obstetrics unit in 2023—has increased the volume of waste produced.

This additional waste load contributes to frequent incinerator breakdowns, and insufficient funding prevents timely repairs. The high cost of approved waste management equipment (containers, carts, and dedicated transport vehicles) also leads some service providers to disregard required standards.

### 5.3.3 Material Constraints:

At the Cocody University Hospital, waste is typically removed from the landfill area using wheeled bins or carts. However, frequent equipment failures often force workers to transport waste manually. Furthermore, the lack of adequate personal protective equipment (PPE) increases their vulnerability to needlestick injuries and respiratory infections.

## VI. CONCLUSION

The management of infectious medical waste is an essential component of healthcare activities within all health facilities. Despite its importance, it continues to represent a major public health concern. Medical waste management, particularly at the Cocody University Hospital, remains a significant challenge that requires urgent attention and sustained corrective action.

The government has undertaken several initiatives aimed at improving waste management practices. These include training specialists in the field, integrating medical waste management modules into the university curriculum for medical and paramedical students, and organizing workshops and awareness programs. Additionally, regulatory frameworks, codes of practice, and the National Plan for the Management of Medical Waste (PNDGS) have been introduced to guide healthcare institutions in adopting appropriate procedures.

However, despite these efforts, the management of infectious medical waste in healthcare facilities—and especially at the Cocody University Hospital—remains inadequate. Observations from this study indicate that waste is not being handled in accordance with established standards. This highlights the need for stronger monitoring systems, improved infrastructure, enhanced staff training, and stricter enforcement of regulations to ensure safe, effective, and compliant waste management practices.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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