

**SYSTEMATIC REVIEW OF LITERATURE ON DISPOSAL PRACTICES OF  
HAZARDOUS WASTE IN RURAL HEALTH UNITS IN DAVAO CITY****Lyneth Joy A. Dorado**Graduate Student, College of Development and Management, University of Southeastern Philippines,  
Philippines**ABSTRACT**

This systematic review was conducted to search for existing literature that discusses hazardous waste disposal in the context of rural health units (RHUs), focusing on Davao City, Philippines. The objective of this study is to identify gaps, examine compliance with existing regulations, and emphasize both the challenges and best practices for the management of hazardous waste in rural healthcare settings. It reviews studies published between 2010 and 2023. The findings highlight systemic problems, including a lack of infrastructure, a lack of training, and non-compliance with rules—that threaten environmental safety and public health. To tackle these challenges, the review calls for capacity building, better allocation of resources, and stricter implementation of waste management policies.

**Keywords:**

Hazardous waste, healthcare waste management, rural health units, waste disposal practices, Davao City.

**INTRODUCTION**

Another essential component of healthcare services is the disposal of hazardous waste, which safeguards both health workers and the communities they serve. Keeping disposal methods in check is mandatory, to avoid environmental pollution, minimize health hazards, and conform to regulations. However, RHUs continue to grapple with hazardous waste management due to limited supplies, inadequate infrastructure, and regulation mismatch. Compared to urban hospitals, wherein healthcare waste disposal facilities and trained personnel are readily available, Rural Health Units (RHUs) face restrictions that hinder the establishment of effective waste management systems. One of the Philippines' largest and fastest-growing cities, Davao City is home to several RHUs, which are critical in bringing where care is most urgently needed in the most marginalized and underserved populations. Although they are crucial components in delivering primary healthcare, numerous industries encounter difficulties in handling hazardous medical waste, such as segregation, storage, transportation, and disposal. To continue protecting public health as well as environmental safety, it is important to make sure that national and international laws on waste management are also being followed. Thus, the search result of relevant articles led to this review, which aims to determine the existing knowledge of the generation and management of hazardous waste in RHUs in Davao City. It also explores current practices, the level of compliance, and the predominant challenges to compliance for these healthcare facilities. The objective is to orient towards bringing about policy-level changes and better waste management practices in rural setups.

**OBJECTIVES**

The study evaluates the compliance of Rural Health Units (RHUs) regarding disposal practices of hazardous waste in Davao City with national and international healthcare waste management standards. It aimed to discover what disposal methods were used, analyze their health and environmental impacts — both negative and positive — and explore the challenges and barriers to proper waste management. Moreover, the study also evaluated the compliance level of the RHUs with existing regulatory frameworks and provided evidence-based recommendations for improving the disposal of hazardous wastes. Achieving these objectives led to the establishment of safer and more sustainable healthcare waste management systems in RHUs.

# IJETRM

## International Journal of Engineering Technology Research & Management

Published By:

<https://www.ijetrm.com/>

### METHODOLOGY

A systematic review was performed to scrutinize the disposal practices of hazardous waste in RHUs related to the Philippines specifically Davao City. Data collection and analysis is the next step, followed by the interpretation of the results, which leads to the final step of the research process. Peer-reviewed literature was mined using scholarly databases such as PubMed, Scopus, Google Scholar, and academic repositories. Furthermore, grey literature (government and NGO reports, policies, etc.) was reviewed to give wider context to existing practices (Paez, 2017). To ensure the continued relevance and reliability of the research specific inclusion and exclusion criteria were enforced. Only articles published during 2010 – 2023 were included, as the intent was to illustrate recent developments and innovative practices. Priority was given to studies investigating hazardous waste disposal practices in rural healthcare settings, specifically in the Southeast Asian context. We chose academic journals, government papers, and reports from reputable organizations that are publicly available, limiting ourselves to English-language publications. Studies on urban healthcare facilities, studies without empirical evidence, duplicate studies, and purely theoretical discussions also were excluded from this review.

Three steps guided our search strategy and study selection process. Eligible studies were screened by titles and abstracts to exclude irrelevant studies. We then performed a full-text review of shortlisted articles applying inclusion and exclusion criteria to ensure eligibility. Lastly, data were extracted and analyzed thematically based on hazardous waste types, disposal methods, compliance status, and challenges. Only methodologically rigorous studies were included using the Critical Appraisal Skills Programme (CASP) checklist for quality assessment (Moher et al., 2009). Despite these countermeasures, the methodology had considerable limitations. Very few regionwide studies have focused solely on Davao City RHUs. Only studies written in English were included: In focusing on English-language literature, the language restriction may have excluded potentially useful insights from studies published in local dialects. Furthermore, over-reliance on grey literature might have led to variability in the reliability of data. However, the integral nature of this review allows comprehensive and evidence-based extrapolation of hazardous waste disposal practices in RHUs.

### RESULTS AND DISCUSSION

This systematic review helps shed light on health facilities with poor disposal practices and serves as a tool for obtaining knowledge on improper hazardous waste disposal among RHU in Davao City and similar contexts. Thematic synthesis of the findings allowed the identification of core trends; including but not limited to the types of waste produced, current disposal methods, compliance with relevant regulations, and challenges faced by healthcare facilities in the management of hazardous waste.

**Hazardous Waste Production in RHUs.** Infectious, chemical, and pathological waste are types of hazardous waste generated at Rural Health Units. Infectious waste — used needles and syringes, contaminated gloves, bandages, and swabs — presents direct threats to healthcare workers and members of the community. Studies (5), like Mendoza et al. (2016) revealed that infectious waste constituted around 60–80% of healthcare waste in RHUs; with poor segregation practices, which often leads to the mixing of general waste with infectious waste. This improper classification of waste can pose even greater risks for cross-contamination and/or improper disposal of waste.

Waste in the form of expired medicines, disinfectants, and laboratory reagents has emerged as a key concern as well. Improper disposal, including liquid chemicals, poured directly into drainage systems, has also been associated with soil and water contamination (Villanueva et al., 2022). RHUs with poor disposal protocols magnify environmental degradation and pose risks to public health.

Pathological waste, another challenge, includes human tissues, organs, and other biological materials from small surgical procedures. Literature (e.g. Paglinawan, 2020) shows that RHUs use burial pits as an alternative to incineration exposing materials to groundwater and highlighting disease transmission. Because these facilities do not have high-tech disposal mechanisms, they are very poor at managing waste.

**Disposal methods and practices of hazardous waste.** The review found wide variation in the disposal methods used by RHUs. These practices include the dumping of waste without sorting and open burning as dedicated waste treatment facilities do not exist. This process can be incredibly harmful to both human health and the environment as, during this process, it emits toxic emissions like dioxins (Abarquez & Castro, 2018).

While burial pits are common, they also pose some challenges. The potential for toxic leachates to seep into groundwater, an issue commonly observed in rural settings with inadequate disposal methods, poses severe risks (Moy 2021). People in some areas practice small-scale incineration. But struggling incinerators that cannot comply with the environmental standards still release poisonous gas into the air. Our findings indicate that current disposal practices are largely out of compliance with domestic health and environmental regulations.

Although such color-coded waste segregation tips are available, they are rarely followed. One of the reasons attributed by Razon and Uy (2021) to the improper segregation is still limited training of the staff and the unavailability of the designated bins for the disposal of each category of waste. A lack of awareness alongside the lack of protective and safety equipment leads to hazardous waste being mixed with general waste, making the disposal process even more difficult.

**Adhering to Regulatory Structures.** The policies that govern hazardous waste disposal in RHUs include Republic Act 9003 (Ecological Solid Waste Management Act) and Department of Health's Healthcare Waste Management Manual. However, data show compliance with these policies still varies widely from facility to facility. One of the key challenges is the absence of enforcement mechanisms at the level of local governments. According to a study conducted by the Department of Health, only 35% of rural health units (RHUs) complied with required waste segregation (DOH, 2020), revealing substantial gaps in adherence. Weak compliance is also the result of resource restraints. Many RHUs are often left underfunded, whereby basic medical supplies take precedence over waste management infrastructure (Morales et al., 2019). So there is no money for proper equipment for waste disposal not to mention training and monitoring of practice. However, lack of sustained investment in waste management means that many of the new facilities do not have adequate access to autoclaves, shredders and other critical treatment technologies.

There are, however, even knowledge gaps among health care workers. Waste management guidelines have been developed but studies show that only 50% of RHU managers are trained in proper waste disposal protocols (Mendoza et al., 2016). And without sufficient training, employees may adopt improper practices—thus creating another gap in adequate hazardous waste management.

**Wastes Management Challenges and Barriers.** There are many structural and logistical challenges in establishing proper disposal for hazardous waste in RHUs. Infrastructure constraints continue to be a serious challenge, with numerous RHUs falling short of basic waste treatment facilities. This shortcoming compels health care centers to resort to unsafe disposal practices, heightening risks to public health and the environment.

The problem is compounded by financial constraints. Most RHUs have limited funds and administrative strength, they tend to emphasize immediate health requirements rather than waste management. As a result, the required infrastructure investments, including waste storage facilities and treatment technologies, never materialize. The same dearth of funding limits human resource development within these countries, making training and education in proper ways of handling hazardous waste inaccessible.

Disposal practices are influenced by cultural factors also. Community awareness of risk is weak in most areas and skepticism towards recommended practices reinforces continued resistance to waste management services. Public antipathy toward incinerators — owing to concerns about emissions — is part of a broader “Not In My Backyard” (NIMBY) mindset that hampers waste management efforts.

Geographic isolation is another concern. This situation is compounded for those RHUs located in remote barangays who are without the logistical support needed to transfer hazardous waste to centralized treatment facilities (Paglinawan, 2020). Unreliable waste collection and disposal networks compel RHUs to employ ad hoc measures such as open burning and on-site burial.

**Solutions and recommendations presented.** However, several important recommendations arise to combat these challenges. Regular training programs on health care waste segregation and disposal practices also contribute significantly to capacity building. Interactive workshops and hands-on training have been shown to yield significantly higher compliance rates (Villanueva et al., 2022). Routine monitoring and evaluation mechanisms can strengthen the protocol adherence aspects of waste management.

It is also important to invest in waste management infrastructure. The lack of proper disposal methods could be addressed through the distribution of autoclaves, secure storage bins, and specialized transportation systems for the

# IJETRM

## International Journal of Engineering Technology Research & Management

Published By:

<https://www.ijetrm.com/>

RHUs' hazardous waste. Also, utilizing partnerships with private organizations, etc., will enable cost sharing arrangements that can help alleviate financial strains on RHUs (Puno et al., 2021).

A second important factor in how to improve hazardous waste management relates to community engagement. This could create public awareness of the dangers of unsafe waste disposal and generate community support for modern waste management alternatives. Even programs which aim to include local stakeholders in decisions about waste management processes can help improve compliance and acceptance of better disposal methods.

### CONCLUSION

The result of this review emphasizes that proper hazardous waste disposal in Rural Health Units in Davao City is an urgent concern. The open burning, improper segregation, and unregulated burial pits of current disposal methods pose serious risks to public health and the environment. There are regulatory frameworks in place, but compliance is sub-optimal as a result of poor enforcement, limited resources, and inadequate knowledge among healthcare providers. To manage this, there needs to be a multi-faceted response in terms of building capabilities, investing in infrastructures and tightening policy regulations. Sustainable and effective hazardous waste management systems require financial support and coordinated partnerships between government sectors, private sector partners, and local communities. These measures should create the framework necessary for RHUs to take steps towards safer, more efficient, and environmentally-responsible waste disposal practices that will contribute to improved health outcomes and environmental safety in rural communities.

### REFERENCES

- [1] Abarquez, J., & Castro, M. (2018). The environmental impact of open burning in healthcare waste disposal. *Environmental Health Journal*, 45(3), 112-125.
- [2] Department of Health (DOH). (2020). *Healthcare Waste Management Manual*. Manila, Philippines: Department of Health.
- [3] Mendoza, R., Santos, P., & Lim, C. (2016). Assessing infectious waste management in rural health units of Southeast Asia: A case study in the Philippines. *Journal of Environmental Studies*, 12(2), 89-104.
- [4] Morales, E., Cruz, L., & Villanueva, G. (2019). Challenges in implementing hazardous waste management regulations in Philippine rural health units. *Waste Management and Research*, 37(4), 233-248.
- [5] Moy, A. (2021). Groundwater contamination risks associated with burial pit disposal of healthcare waste: A rural case study. *Journal of Public Health and Environmental Safety*, 29(1), 78-92.
- [6] Paglinawan, B. (2020). Pathological waste disposal practices in rural health facilities: Assessing alternative solutions. *Philippine Journal of Public Health*, 15(1), 56-71.
- [7] Puno, R., Torres, S., & Ramos, D. (2021). Public-private partnerships in healthcare waste management: A sustainable solution for rural health units? *Journal of Environmental Policy and Governance*, 27(3), 120-135.
- [8] Razon, M., & Uy, C. (2021). Waste segregation challenges in rural healthcare settings: Compliance issues and training gaps. *International Journal of Healthcare Waste Management*, 19(2), 200-215.
- [9] Villanueva, G., Hernandez, P., & Santos, J. (2022). Chemical waste disposal in Philippine rural health units: A neglected environmental hazard? *Environmental Research and Policy*, 44(2), 321-340.