Indonesian Journal of Global Health Research
Volume 8 Number 2, April 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

ANALYSIS OF THE EFFECTIVENESS OF MEDICAL WASTE MANAGEMENT POLICIES AT HEALTH LABORATORY

Andri Yanti, Subang Aini Nasution*, Hartono, Rapael Ginting, Sondang Selviana Silitonga, Ismail Usman
Master of Public Health, Faculty of Medicine and Health Sciences, Universitas Adiwangsa Jambi, Jl. Sersan Muslim, The Hok, Jambi Selatan, Kota Jambi, Jambi 36138, Indonesia
*subang.aini@unaja.ac.id

ABSTRACT
The implementation of medical waste management policies at the laboratory level still faces challenges in the form of non-compliance with operational standards, limited resources, and weak evaluative monitoring. This study aims to analyze the effectiveness of medical waste management policies at the UPTD Puskesmas in Jambi City. This study uses a case study method, with a qualitative approach, where the sampling technique used is purposive sampling. Total number of informants in this study is 20 people. Data obtained from interviews, observations, and document analysis will be analyzed thematically to identify emerging patterns, themes, and issues related to medical waste management policies. As a result of data management, there are several regulations for medical waste management at the UPTD Puskesmas in Jambi City, starting from the Law on Environmental Protection and Management, Presidential Regulations, Ministerial Regulations, and SOPs for the Puskesmas themselves. Medical waste management is carried out through several stages, starting from sorting, internal transportation, temporary storage, to external transportation and processing involving third parties. There are challenges faced in medical waste management, including untrained human resources, budget constraints, and inconsistent external transportation schedules. Based on the results of the analysis and discussion regarding the effectiveness of medical waste management policies at the UPTD Labkesda Jambi City, it can be concluded that the Regulatory and Implementation Aspects of the UPTD Labkesda Jambi City already have a strong regulatory basis, both externally and internally and Cooperation Agreements with third parties. However, there is still a gap between written policies and implementation in the field, so that the effectiveness of the policy has not reached its optimal point. The Human Resources Aspect shows that the quality and quantity of human resources are the main determinants in waste management. The Infrastructure Aspect shows that the facilities are quite adequate, but more modern and sustainable waste management is needed.

Keywords: medical waste; medical waste management; medical waste management policy

How to cite (in APA style)
Yanti, A., Nasution, S. A., Hartono, H., Ginting, R., Silitonga, S. S., & Usman, I. (2026). Analysis of the Effectiveness of Medical Waste Management Policies at Health Laboratory. Indonesian Journal of Global Health Research, 8(2), 851–858. https://doi.org/10.37287/ijghr.v8i2.1606.

INTRODUCTION

Medical waste management is one of the important aspects in maintaining public health and environmental sustainability (Sulistiyowati, 2018). Medical waste produced from health service activities has the potential to pose a risk of infection, toxicity, and other hazards to humans and the environment if not managed properly (Jason & Glenwick, 2016). Based on data from the Ministry of Health of the Republic of Indonesia in 2020, it is estimated that as many as 1,000 tons of medical waste are generated every day throughout Indonesia, with a significant proportion coming from regional health laboratories (Kementerian Kesehatan RI, 2024). In 2022, the number of health service facilities (fasyankes) that manage medical waste according to the new standards will reach 5,224 out of a total of 13,446 health facilities throughout Indonesia. In Jambi Province itself, only 23.9% of health facilities have carried out medical waste management according to standards (Nugraha et al., 2023).

Jambi City, as a growing region, faces great challenges in this regard, especially in the regional health laboratory sector which plays a vital role in the diagnosis and treatment of diseases. In this context, medical waste management policies in Jambi City need to be analyzed to assess the level of

effectiveness. The policy covers various flows, ranging from collection, storage, transportation, to waste destruction. Based on the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.56/Menlhk-Setjen/2015, every health facility is required to have a Hazardous and Toxic Materials (B3) waste management system that meets standards. However, the implementation of this policy often encounters obstacles, such as the lack of adequate supporting facilities and the low awareness of health workers on the importance of safe waste management (Gelisar & Sari, 2024).

The impact of ineffective medical waste management is very detrimental. For example, there have been cases of environmental pollution due to hospital medical waste that pollutes three rivers in West Java (Adiratna et al., 2022). At the local level, data from the Jambi City Health Office (2021) shows that around 30% of health facilities in this city still do not meet the set medical waste management standards. From a public health perspective, medical waste such as syringes, infectious materials, and expired medicines can trigger the spread of disease and increase the risk of cross-border infections. A study indicates that 60% of medical waste in Indonesia has not been managed properly, thus presenting a real threat to public health (Ningrum, 2019). The volume of medical waste in Jambi City also shows an increasing trend. Data from the Jambi City Health Office recorded that total medical waste in 2021 reached 12 tons per month. This figure increases to 13 tons per month in 2022, and is expected to touch 15 tons per month in 2023. This increase runs linearly with the increase in the number of health facilities and laboratories operating. These statistics confirm that medical waste management must be the top priority of local governments.

In particular, the Jambi City Regional Health Laboratory (Labkesda), which was designated as a Regional Technical Service Unit (UPTD) based on the Jambi Mayor Regulation No. 62 of 2020 and has been operating since February 2021, has a high volume of activity. UPTD Labkesda Jambi City provides molecular biology examination services, including Covid-19 rRT-PCR, with the number of samples reaching 37,358 until December 2021. By 2024, the number of clinical and environmental laboratory examinations will reach 8,012 examinations, resulting in an accumulation of medical waste of 4,518 kg. Although the volume of activities and waste produced is quite massive, there has been no previous research that specifically examines the management of medical waste at the UPTD Labkesda Jambi City. Previous research by Putri et al. (2024) regarding the effectiveness of medical waste management policies at the Labuhan Rasoki Health Center, Padang Sidempuan City, found that even though management has followed regulations, staff have never received competency training related to medical waste management. Departing from the research gap, this study was conducted to provide a comprehensive overview and analyze the effectiveness of medical waste management policies at the Jambi City Regional Health Laboratory.

METHOD

This study uses a qualitative approach with a case study method. A qualitative approach was chosen to understand in depth the effectiveness of medical waste management policies at the Regional Health Laboratory (Labkesda) of Jambi City. According to Creswell (2014), qualitative approaches allow researchers to explore social and cultural phenomena holistically. It is relevant to understand the context of medical waste management that involves various aspects, from regulations to practice in the field.

The case study method was chosen because it was able to provide an in-depth overview of policy implementation in a specific location. As stated by Yin (2014), case studies are effective for exploring complex phenomena in real contexts, especially when researchers want to analyze the processes and outcomes of policies that have been implemented. The research was conducted for two months, namely from August to September 2025. This period was chosen to observe the medical waste management process under various operational conditions, including when the workload of laboratory activities is at its peak.

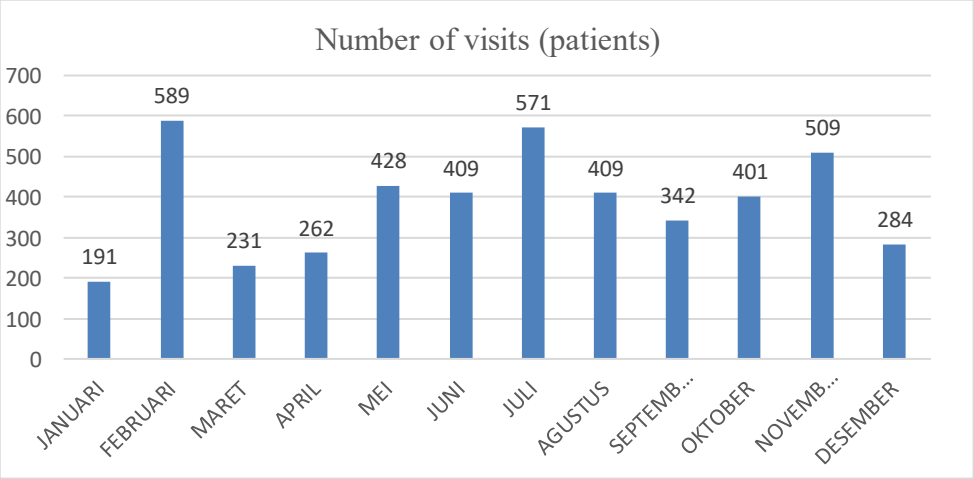
The informants in this study are staff who are directly involved in the medical waste management system at the UPTD Labkesda Jambi City. The selection of informants is carried out by a *purposive sampling technique* to obtain data from parties who have relevant knowledge and experience. The total number of informants in this study is 20 people, consisting of: Sanitarian Personnel: 3 people (technical implementers of waste management). Management: 4 people (Head of UPTD, Head of Administration Sub-Division, K3 Officer, and Head of Quality). Cleaning Personnel: 3 people (waste collection and transport staff). Laboratory staff: 10 people (waste generators from various examination rooms). The main instrument in this study is the researcher himself (*human instrument*), supported by an interview guide that contains a list of open-ended questions related to waste management policies and practices. Observation Sheet: List of aspects observed in the field (facilities, sorting procedures, etc.), as well as Documentation List: Annual report records, waste logbooks, and internal regulatory documents. Data were analyzed thematically to identify emerging patterns, themes, and issues related to medical waste management policies.

RESULT

The results of the work that are the achievement of performance targets are explained by the results of visits and total examinations in each lab. The following is a graph of the number of visits and inspections at the Jambi City Labkesda UPTD:

Kesmas Laboratory Patient Visits in 2024

The total number of health lab patient visits in 2024, each month, is described in the following graph.



Graph 1, Patient visits in 2024

It can be seen that the number of patient visits in 2024 has increased and decreased. In February, there was a surge in patients with 589 visits, then a decrease in January and March. The number of

patient visits increased again in July 2024, as many as 571 patient visits.

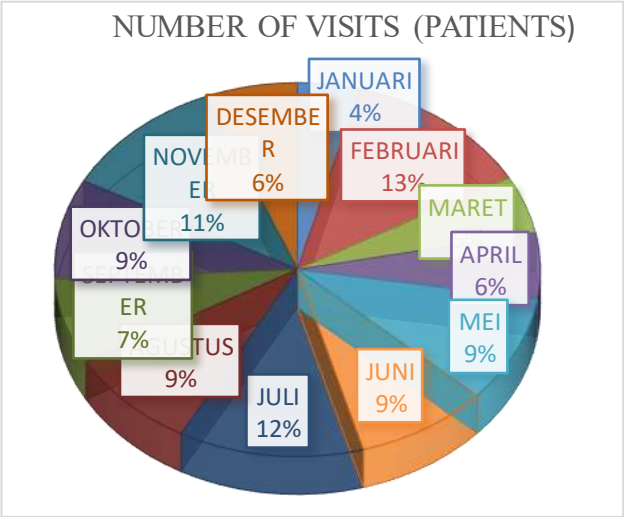
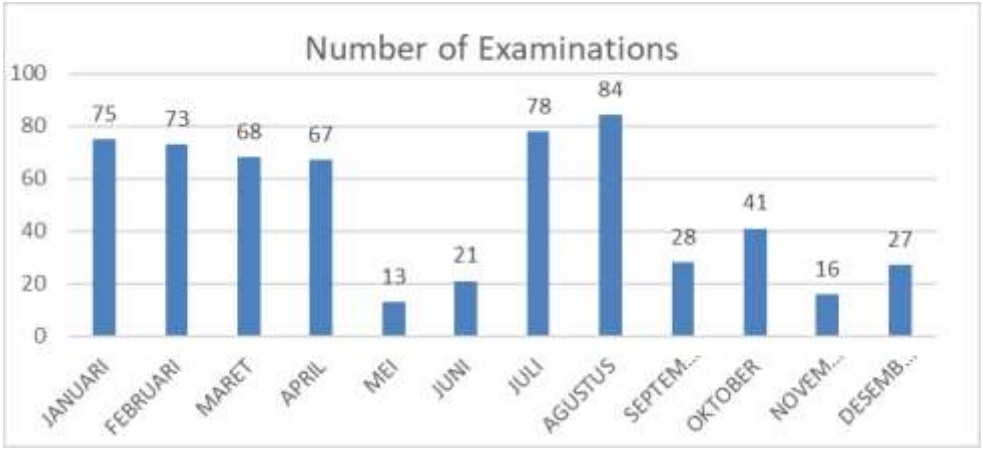


Chart 1, Patient Visits Percentage in 2024

This chart shows the percentage of visits in January by 4% and increased to 13% in February 2024. This means that patient visits from January to February 2024 have increased by 9%.

Kesmas Laboratory Examination in 2024

The total number of health lab inspections in 2024 every month are described in the following graph.



Graph 2. Number of Kesmas Laboratory Examinations in 2024

Based on the graph above, the lowest number of lab kesmas examinations was found in May, which was 13 samples. The highest number of examinations was found in August at, with 84 samples. As for other months, the number of examinations tends to be stable, ranging from 60 to 85 samples every month.

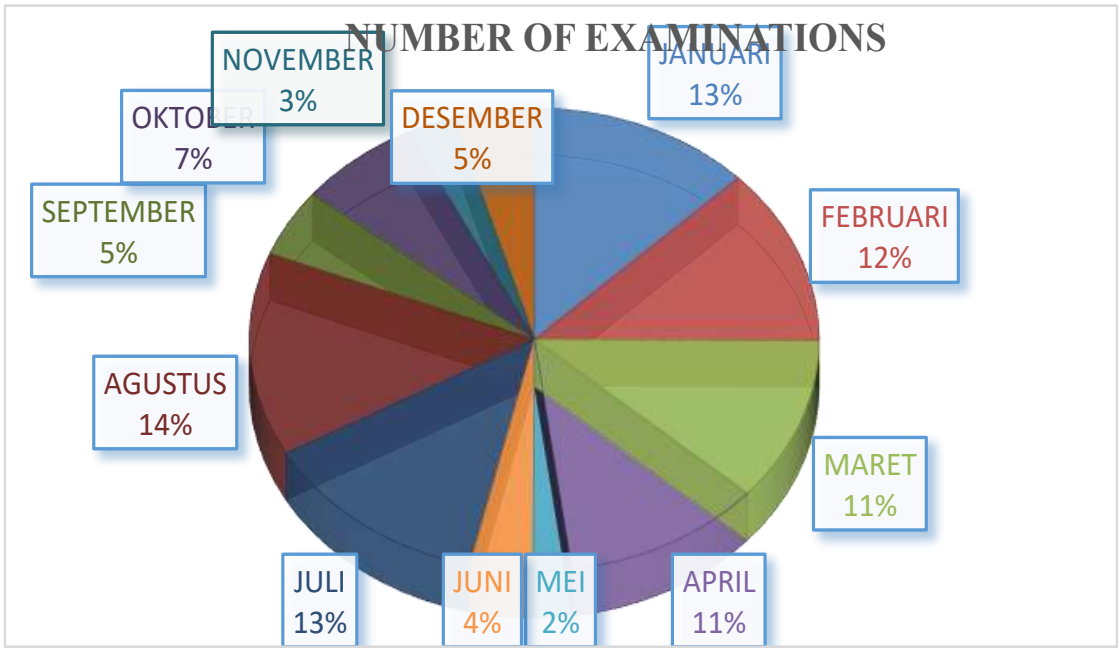
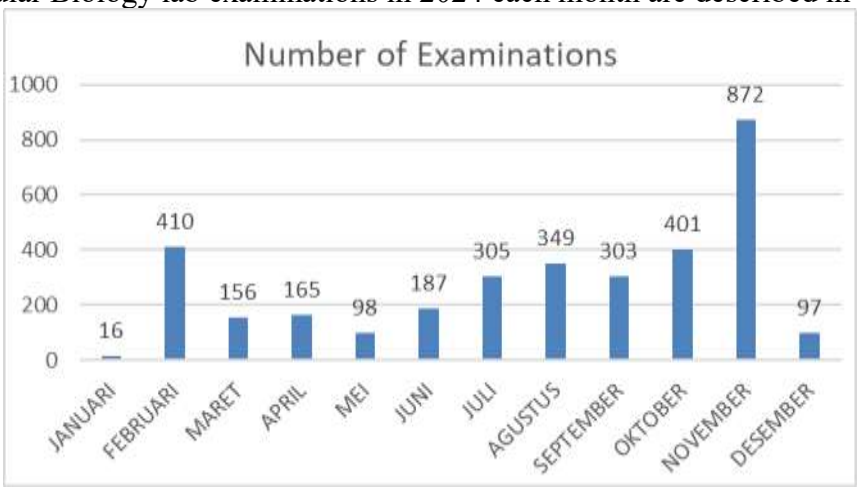


Diagram 2. Percentage of the Number of Lab.Kesmas Examinations in 2024

Total Molecular Biology Laboratory Examinations in 2024

The total Molecular Biology lab examinations in 2024 each month are described in the graph below.



Graph 2. Total Molecular Biology Lab Inspections In 2024

Based on the graph above, the number of Molecular Biology lab examinations in 2024 was the highest 3 months in November with 872 samples, February with 410 samples, and 401 samples in October.

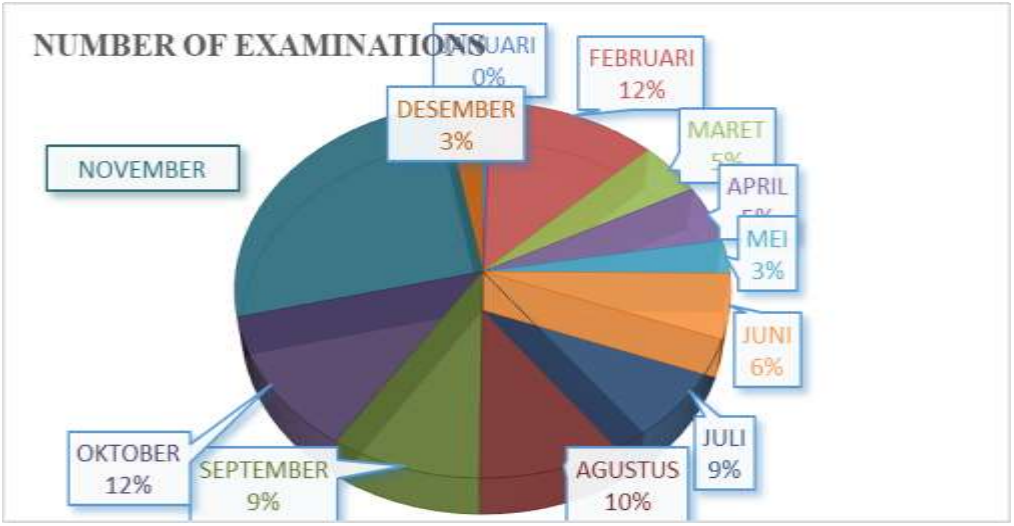


Diagram 3. Percentage of the Number of Molecular Biology Lab Examinations in 2024

Total Microbiology Laboratory Inspections in 2024

The total examination of the Microbiology Lab in 2024 is described in the diagram below

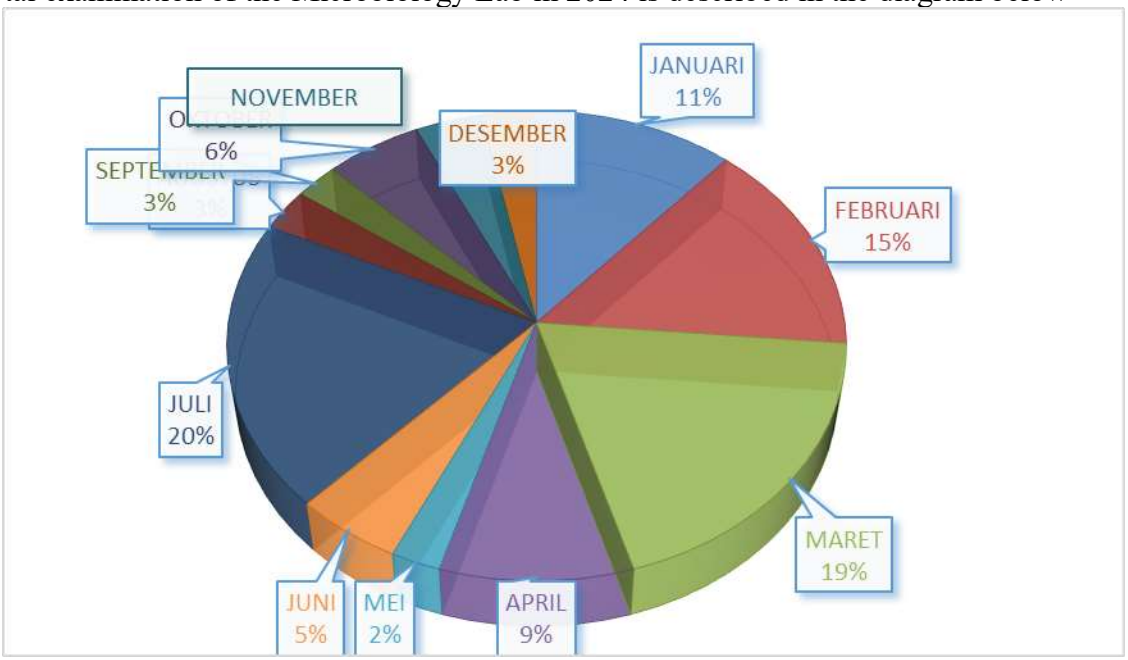


Diagram 4. Percentage of the number of Microbiology Lab Examinations in 2024

Based on the diagram above, the number of Microbiology Lab examinations in 2024 will be at least 2% of samples in May and at most 20% of samples in July.

DISCUSSION

Regulatory Framework and Resources for Medical Waste Management

Medical waste management at the Jambi City Regional Health Laboratory (Labkesda) UPTD is based on a strict regulatory hierarchy to ensure environmental safety and public health. The main legal instruments include: Law No. 32 of 2009 concerning Environmental Protection and Management. Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management, which prioritizes the principle *of ultimum remedium* in environmental law enforcement. Permenkes No. 18 of 2020 concerning Region-Based Medical Waste Management of Health Facilities. Internally, Labkesda already has SOPs for Waste Handling and B3 Management Programs. However, in the aspect of Human Resources (HR), significant obstacles were found. Although supported by 4 sanitarians, 2 cleaners, and 1 K3 officer, there is not a single officer who has a special training certificate for medical waste management. This risks the

low technical compliance in the field. In terms of the budget, the 2025 fund allocation of IDR 20,013,300 is focused on transportation and destruction costs. However, this budget is considered not optimal for long-term infrastructure development, such as the expansion of the WWTP network (Ula et al., 2019).

Analysis of the Implementation of Medical Waste Management

The waste management process at the Jambi City Health Laboratory consists of several critical stages: Identification and Sorting. Based on the results of the identification, Labkesda produces various types of chemical waste (residual clinical pathological reagents such as *creatinine, bilirubin, methanol*) that are irritating and corrosive, as well as infectious waste (syringes, masks, gloves). Sorting is carried out using special containers: *safety boxes* for sharp objects and yellow plastic for infectious waste. Temporary Storage (*Cold Storage*) Labkesda has used *Cold Storage* with a temperature of 2-8°C. This technology effectively slows down the biological degradation of waste and prevents the colonization of pathogenic bacteria during the transport waiting period. Labkesda's External Transportation and Processing in collaboration with PT. Anggrek Jambi Makmur (Transporter) and PT. Tenang Jaya Sejahtera (Processor B3), which has an official permit from the Ministry of Environment and Forestry. This cooperation ensures that waste is destroyed using technology that meets emission standards. However, there are inconsistencies in the frequency of waste pick-up (Rencana Aksi Kegiatan Balai Teknik Kesehatan Lingkungan Dan Pengendalian Penyakit (Btklpp) Kelas, 2019).

Challenges and Success Factors

Some of the main obstacles found in this study are:

1) Technical Competence: The absence of certified training for sanitarians leads to an uneven understanding of risks. This is evident from observational findings where infectious waste (masks) are still found in non-medical bins.
2) Transportation Schedule Uncertainty: Although the contract mentions transportation being carried out 2 x 24 hours for infectious waste, the data show irregular transportation intervals (Table 4.11), even reaching time intervals of more than one month in a given period. This violates the principle of storing infectious medical waste at room temperature that should not last more than 2 days.
3) Limited WWTP Infrastructure: Budget efficiency has resulted in the construction of WWTP sewers to the river mouth being hampered, so that the wastewater treatment system has not been fully functional (Simbolon et al., 2024).

Recommendations for Increasing Effectiveness

To achieve system sustainability, several strategic steps are recommended: HR Certification: Require technical training in B3 waste management for all sanitarian personnel. Internal Compliance Audit: Conduct regular supervision to minimize waste separation errors in sampling rooms and laboratories. And Vendor Evaluation: Review the commitments of third parties (*transporters*) regarding the timeliness of transportation according to the contract to avoid the accumulation of waste beyond the capacity *of cold storage* (Maliangkay et al., 2023).

CONCLUSION

Based on the results of the analysis and discussion of the effectiveness of medical waste management policies at the Jambi City Regional Health Laboratory (Labkesda), it can be concluded as follows regulation and Implementation Aspects: UPTD Labkesda Jambi City already has a strong regulatory foundation, both externally (Government Laws and Regulations) and internally (Work Program, *Standard Operating Procedure*/SOP, and Cooperation Agreements with third parties). However, there is still a gap between written policies and implementation in the field, so the effectiveness of policies has not reached the optimal point. Human Resources (HR) Aspect: The quality and quantity of human resources are the main determinants in waste management. Even

though the organizational structure has been formed, there are still obstacles to the technical competence of officers that are not evenly distributed. Many officers who are directly involved in waste handling have not received adequate specialized training on safe medical and B3 waste management procedures. Infrastructure Aspect: The facilities and infrastructure at the Jambi City Health Laboratory are basically quite adequate, but increased investment is needed in more modern and sustainable waste management infrastructure. Optimizing *pre-treatment* facilities at source sites is crucial to minimizing the risk of infection before waste is transported to landfills.

REFERENCES

Adiratna, Y., Astono, S., Fertiaz, M., Subhan, Sugistria, C. A. O., Prayitno, H., Khair, R. I., Brando, A., & Putri, B. A. (2022). *The Indonesian National Occupational Safety And Health Profile In 2022* (S. Astono (Ed.)). Kementerian Ketenagakerjaan Republik Indonesia. Https://Satudata.Kemnaker.Go.Id/Satudata-Public/2022/10/Files/Publikasi/1675661836215_The%2520Indonesian%2520OSH%2520Profile%25202022_Compiled%252020230124_Compressed.Pdf

Rencana Aksi Kegiatan Balai Teknik Kesehatan Lingkungan Dan Pengendalian Penyakit (Btklpp) Kelas, 53 Journal Of Chemical Information And Modeling 1 (2019).

Gelisar, R., & Sari, N. R. (2024). Penerapan Fasilitas Pendukung Kesehatan Dan Keselamatan (K3) Service Dan Operation Di Bandara Sultan Aji Muhammad Sulaiman Sepinggan Pada Maskapai Garuda Indonesia. *JETBUS Journal Of Education Transportation And Business*, *1*(2), 140–154. Https://Doi.Org/Https://Doi.Org/10.57235/Jetbus.V1i2.3384

JASON, L. A., & GLENWICK, D. S. (2016). HANDBOOK OF METHODOLOGICAL APPROACHES TO COMMUNITY-BASED RESEARCH Qualitative, Quantitative, And Mixed Methods. In *United States Of America By Oxford University Press* (Vol. 11, Issue 1). Http://Scioteca.Caf.Com/Bitstream/Handle/123456789/1091/RED2017-Eng-8ene.Pdf?Sequence=12&Isallowed=Y%0Ahttp://Dx.Doi.Org/10.1016/J.Regsciurbeco.2008.06.005%0Ahttps://Www.Researchgate.Net/Publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

Kementerian Kesehatan RI. (2024). *PROFIL KESEHATAN INDONESIA 2023*. Kementerian Kesehatan Republik Indonesia.

Maliangkay, K. S., Rahma, U., Putri, S., & Iswanto, A. H. (2023). Peningkatan Mutu Pelayanan Kesehatan Di Rumah Sakit Dengan Metode Six Sigma : Literature Review. *An-Najat : Jurnal Ilmu Farmasi Dan Kesehatan*, *1*(2), 29–38. Https://Doi.Org/Https://Doi.Org/10.59841/An-Najat.V1i2.33

Ningrum, R. W. (2019). Pengaruh Posbindu-PTM Dengan Tingginya Penyakit Diabetes. *Implementation Science*, *39*(1), 1–15. Http://Dx.Doi.Org/10.1016/J.Biochi.2015.03.025%0Ahttp://Dx.Doi.Org/10.1038/Nature10402%0Ahttp://Dx.Doi.Org/10.1038/Nature21059%0Ahttp://Journal.Stainkudus.Ac.Id/Index.Php/Equilibrium/Article/View/1268/1127%0Ahttp://Dx.Doi.Org/10.1038/Nrmicro2577%0Ahttp://

Nugraha, A., Idayanti, S., & Rahayu, K. (2023). Penerapan Konsep " Quality Of Care " Dalam Pelayanan Kesehatan Menurut Undang-Undang Kesehatan. *Pancasakti Law Journal*, *1*(2), 259–266.

Simbolon, R. R., Harramain, F. P., Rizaldi, M., & Sonjaya, P. (2024). Pentingnya Penerapan Keselamatan Dan Kesehatan Kerja (K3) Sebagai Faktor Penentu Optimalisasi Produktivitas Kerja. *PAJAMKEU : Pajak Dan Manajemen Keuangan*, *1*(3), 17–31.

Sulistiyowati, W. (2018). Buku Ajar Kualitas Layanan : Teori Dan Aplikasinya. In S. B. Sartika & M. T. Multazam (Eds.), *Revista Brasileira De Linguística Aplicada* (Pertama, Vol. 5, Issue 1). UMSIDA Press.

Ula, V. R., Darianto, & Hayat, A. A. (2019). Meningkatkan Kepuasan Pasien Melalui Pelayanan Prima Dan Trust Pasien. *Jurnal ITB Ahmad Dahlan Lamongan*, 46–56.