AHMAR METASTASIS HEALTH JOURNAL

Available online at: http://journal.ahmareduc.or.id/index.php/AMHJ
Vol. 5. No. 1. June 2025, Page 45-53
P-ISSN: 2797-6483 E-ISSN: 2797-4952

Comparison of Temporary Waste Storage (TPS) Management at Community Health Centres (Puskesmas) with TPS Standards

Riski Allivia Rachma[1*], Zufra Inayah[1], Sestiono Mindiharto[1], Nugrahadi Dwi Pasca Budiono[1]

[1] Public Health Study Program, Faculty of Health, Universitas Muhammadiyah Gresik, Gresik, East Java, Indonesia

ARTICLE INFO

***Article Type*:**
Research

Article History:
Received: 10 June 2025
Accepted: 29 June 2025
Published: 30 June 2025

[*]***Corresponding author***
Email: *riski.allivia@gmail.com*

ORIGINAL ARTICLE

ABSTRACT

The condition of Temporary Waste Storage (TPS) facilities in community health centres (Puskesmas) across Tuban Regency still requires particular attention, as only 24% of them currently possess an integrated Environmental Management Statement Letter (SPPL) issued by the Department of Environment and Transportation (DLHP). This study aims to analyse the comparison of TPS management in Puskesmas against the applicable standards in 2024. It is an observational survey study using a quantitative approach. The study population consisted of 33 Puskesmas in Tuban Regency, with a sample of 8 inpatient Puskesmas and 6 outpatient Puskesmas that already have an integrated SPPL. The research instruments covered various stages of waste management, including waste segregation, storage, transportation, personal protection, and the volume of medical waste generated. Data were analysed using Fisher's Exact Test. The results showed that the majority of inpatient Puskesmas (75%) met the TPS standards, as did most outpatient Puskesmas (83.3%). The highest amount of medical waste was found in inpatient Puskesmas, with an average of 139.38 kg, while outpatient Puskesmas produced an average of 68.83 kg. In conclusion, TPS management in Puskesmas within Tuban Regency in 2024 has generally complied with current regulations. Improving existing infrastructure and updating Standard Operating Procedures (SOPs) are essential to support more effective hazardous waste (B3) management and to reduce the volume of waste generated.

Keywords: Medical Waste, Temporary Storage Facilities, Health Center, Inpatient, Outpatient.

ABSTRAK

Kondisi sarana dan prasarana Tempat Penampungan Sementara (TPS) di Puskesmas wilayah Kabupaten Tuban masih membutuhkan perhatian khusus, mengingat dokumen SPPL (Surat Pernyataan Pengelolaan Lingkungan) terintegrasi dari Dinas Lingkungan Hidup dan Perhubungan (DLHP) baru dimiliki oleh 24% Puskesmas. Penelitian ini bertujuan untuk menganalisis perbandingan pengelolaan TPS di Puskesmas terhadap standar yang berlaku pada tahun 2024. Penelitian ini merupakan studi survei observasional dengan pendekatan kuantitatif. Populasi dalam penelitian ini adalah 33 Puskesmas di Kabupaten Tuban, dengan sampel terdiri dari 8 Puskesmas Rawat Inap dan 6 Puskesmas Rawat Jalan yang telah memiliki SPPL terintegrasi. Instrumen penelitian mencakup tahapan pengelolaan limbah seperti proses pemilahan, penyimpanan, pengangkutan, perlindungan diri, serta timbulan limbah medis yang dihasilkan. Analisis data dilakukan menggunakan uji Fisher's Exact. Hasil penelitian menunjukkan bahwa sebagian besar Puskesmas Rawat Inap telah memenuhi standar TPS Puskesmas (75%), demikian pula sebagian besar Puskesmas Rawat Jalan (83,3%). Timbulan sampah medis tertinggi ditemukan di Puskesmas Rawat Inap dengan rata-rata 139,38 kg, sedangkan Puskesmas Rawat Jalan menghasilkan rata-rata 68,83 kg. Kesimpulannya, pengelolaan TPS di Puskesmas wilayah Kabupaten Tuban pada tahun 2024 umumnya telah sesuai dengan ketentuan yang berlaku. Perbaikan sarana dan prasarana yang ada serta pembaruan Standar Operasional Prosedur (SOP) sangat penting untuk menunjang pengelolaan limbah B3 yang lebih optimal dan mengurangi jumlah timbulan limbah.

Kata Kunci: Sampah Medis, TPS, Puskesmas, Rawat Inap, Rawat Jalan.

INTRODUCTION

Indonesia ranks second among five Southeast Asian countries in terms of medical waste volume, with the following figures: the Philippines (280 kg/day), Indonesia (212 kg/day), Malaysia (154 kg/day), Thailand (210 kg/day), and Vietnam (160 kg/day). Laksono and Agustina (2021) reported that Indonesia currently has 2.820 hospitals, 9.825 community health centres (Puskesmas), and 7.641 clinics. These healthcare facilities produce up to 296.86 tonnes of medical waste per day, while the available processing capacity only reaches 115.68 tonnes per day. The number of healthcare facilities (hospitals and Puskesmas) that manage medical waste in accordance with standards is 2.431 out of approximately 12.831 facilities (Hasiu et al., 2024).

Puskesmas are integrated service units under the authority of the District Health Office, responsible for delivering both public and individual primary healthcare services, with a stronger emphasis on promotive and preventive efforts within their working areas. Their operations are based on the principles of health promotion, regional accountability, community empowerment, accessibility, appropriate technology, integration, and continuity (Menteri Kesehatan Republik Indonesia, 2019). These healthcare units generate both solid and liquid medical waste from treatment rooms such as dental clinics, general clinics, maternal and child health clinics, laboratories, and pharmacies. The types of medical waste generated through healthcare activities can pose serious health risks, particularly during the processes of collection, segregation, temporary storage, transportation, disposal, and final treatment (Aulia et al., 2021).

Medical waste is a by-product of healthcare services, potentially causing disease transmission, other health hazards, and environmental pollution (Nwachukwu, Orji, & Ugbogu, 2013; Husaini et al., 2024). As such, proper medical waste management is essential. Temporary storage of such waste must be carried out in approved hazardous and toxic waste storage facilities, in accordance with legal regulations. The duration of medical waste storage must be adjusted based on the temperature and waste characteristics, such as infectious waste, sharps, pathological waste, and other medical waste (Menteri Kesehatan Republik Indonesia, 2020).

The Temporary Storage Facility (TPS) at a Puskesmas is one of the key components in medical waste management. However, in practice, waste storage in TPS is often unhygienic; when waste exceeds the bin capacity, it is simply placed on the floor, increasing the risk of contamination, as medical waste contains viruses and bacteria that may affect nearby individuals (Rinardi & Maria, 2021). Tuban Regency has 33 Puskesmas, of which 8 (24.24%) are inpatient units and 25 (75.76%) are outpatient units (Badan Pusat Statistik Kabupaten Tuban, 2023; Dinas Kesehatan Kabupaten Tuban, 2024).

In general, medical waste management at Puskesmas in Tuban Regency continues to face challenges, particularly in relation to TPS infrastructure. Based on a preliminary study conducted by the researchers in June 2024, it was found that only 8 of the 33 Puskesmas (24%) had obtained an integrated Environmental Management Statement (SPPL) from the Environmental Agency. Observations at 9 Puskesmas showed that 66.7% lacked adequate safety facilities, such as fire extinguishers and spill kits, in the TPS, which are necessary to protect waste handlers during spillages or fires. Additionally, 33.3% of TPS units were located within the main Puskesmas building and in areas frequently accessed by patients and visitors, while 66.7% had unlocked doors and no signage, making them vulnerable to unauthorised access.

Puskesmas in Tuban Regency store medical waste generated from emergency units, family planning services, immunisation, laboratories, and pharmacies, including waste from branch facilities such as auxiliary health centres and village maternity clinics (Polindes). They provide specific containers for hazardous and toxic (B3) waste using yellow plastic bags with special labels, and sharp waste is collected in specially marked yellow safety boxes. The collected waste is then transported by third-party service providers designated by each Puskesmas for further processing. According to Ministry of Environment Regulation No. 6 of 2021, healthcare facilities are required to follow technical procedures for managing hazardous waste, which include identifying, segregating, packaging, and storing waste according to its characteristics (Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia, 2021).

The novelty of this study lies in the specific comparison of TPS management conditions between inpatient and outpatient Puskesmas that already have integrated SPPL, a topic that has not been extensively or comprehensively researched. This research is important as a basis for improving medical waste management systems at the primary healthcare level. The aim of this

study is to analyse the comparison of TPS management between inpatient and outpatient Puskesmas and their compliance with TPS standards in the working area of Tuban Regency in 2024.

RESEARCH METHODS

This study employed a survey design, which is a type of quantitative research aimed at collecting information related to the prevalence, distribution, and relationships between research variables (Munir et al., 2022). The objective of this study was to analyse the comparison of Temporary Waste Storage (TPS) management at community health centres (Puskesmas) against the standard TPS guidelines in the working area of Tuban Regency in 2024. The research will be conducted at Puskesmas facilities within Tuban Regency from June to December 2024.

The population refers to the generalised area consisting of subjects or objects that have certain quantities and characteristics defined by the researcher for study and from which conclusions will be drawn (Adiputra et al., 2021). The population in this study includes all 33 Puskesmas in the Tuban Regency area, according to data from the Tuban District Health Office in 2024, comprising 8 inpatient Puskesmas and 25 outpatient Puskesmas. A sample is a portion of the entire population to be studied or evaluated that possesses specific characteristics (Munir et al., 2022). The sample in this study consisted of inpatient and outpatient Puskesmas that had obtained an integrated SPPL in Tuban Regency in 2024.

The sampling technique used in this research was non-probability sampling, meaning not every element or member of the population had an equal chance of being selected. The sampling method used was purposive sampling, in which samples were selected based on specific criteria established by the researcher, according to known characteristics or traits of the population (Adiputra et al., 2021).

The instrument used in this study was a checklist form for assessing compliance with facility and infrastructure requirements for the TPS process in Puskesmas across Tuban Regency in 2024. Once data collection was completed, the data were analysed descriptively and comparatively. Descriptive analysis involved the scientific processing of data presented in tables and narrative form. Inferential analysis was performed using SPSS version 2.1 for statistical testing.

The descriptive analysis included tables and narratives to identify the facility and infrastructure factors related to TPS in the 8 inpatient Puskesmas and the 7 outpatient Puskesmas that had obtained an integrated SPPL from the Environmental Agency. Comparative analysis was conducted using Fisher's Exact Test at a 95% confidence level ($p < 0.05$) to examine differences in TPS management across Puskesmas in Tuban Regency in 2024, particularly given the small sample size and the presence of cells with expected counts below 20. This study also received ethical approval from the Research Ethics Committee of Universitas Muhammadiyah Gresik under approval number: 093/KET/II.3.UMG/KEP/A/2024.

RESULTS

Table 1. Frequency Distribution by Age of TPS Waste Management Officers at Inpatient and Outpatient Puskesmas Units in the Working Area of Tuban Regency, December 2024

Age of TPS Waste Management Officers at Puskesmas	Inpatient Puskesmas Units		Outpatient Puskesmas Units	
	f	%	f	%
Adolescents (15 to 24 years)	0	0.0	0	0.0
Prime/Productive Age (25 to 54 years)	8	100.0	6	100.0
Elderly (> 55 years)	0	0.0	0	0.0
Total	8	100.0	6	100.0

Based on Table 1, it is known that all TPS waste management officers at both inpatient and outpatient Puskesmas units in the Working Area of Tuban Regency in December 2024 were aged between 25 and 54 years, categorised as being in the prime/productive age group, each accounting for 100.0%.

Table 2. Frequency Distribution by Sex of TPS Waste Management Officers at Inpatient and Outpatient Puskesmas Units in the Working Area of Tuban Regency, December 2024

Sex of TPS Waste Management Officers at Puskesmas	Inpatient Puskesmas Units		Outpatient Puskesmas Units	
	f	%	f	%
Male	1	12.5	0	0.0
Female	7	87.5	6	100.0
Total	8	100.0	6	100.0

Based on Table 2, it is known that the majority of TPS waste management officers at inpatient Puskesmas units in the Working Area of Tuban Regency in December 2024 were female, accounting for 87.5%. Meanwhile, all TPS waste management officers at outpatient Puskesmas units were female, representing 100.0%.

Table 3. Description of Medical Waste Generation Data at Inpatient and Outpatient Puskesmas Units in the Working Area of Tuban Regency, December 2024

Description	Inpatient Puskesmas Units	Outpatient Puskesmas Units
Minimun	48 kg	40 kg
Maximum	256 kg	116 kg
Average	139.38 kg	68.83 kg

Based on Table 3, it is known that the lowest amount of medical waste generated by inpatient Puskesmas units in the working area of Tuban Regency in December 2024 was 48 kg, while the lowest amount generated by outpatient Puskesmas units was 40 kg. The highest amount of medical waste generated by inpatient units was 256 kg, whereas the highest for outpatient units was 116 kg. On average, inpatient Puskesmas units produced 139.38 kg of medical waste, while outpatient units generated an average of 68.83 kg.

Table 4. Facility and Infrastructure Factors of TPS Available at Inpatient Puskesmas in the Working Area of Tuban Regency, December 2024

TPS Management at Inpatient Puskesmas	Frequency (n)	Percentage (%)
Not in Compliance with Puskesmas TPS Standards	2	25.0
In Compliance with Puskesmas TPS Standards	6	75.0
Total	8	100.0

Based on Table 4, it was found that most of the TPS facility and infrastructure factors available at inpatient Puskesmas in the working area of Tuban Regency in December 2024 met the standard criteria, with 6 Puskesmas (75.0%) being in compliance. Meanwhile, 2 Puskesmas (25.0%) were not in compliance with the TPS standards.

Table 5. Facility and Infrastructure Factors of TPS Available at Outpatient Puskesmas in the Working Area of Tuban Regency, December 2024

TPS Management at Outpatient Puskesmas	Frequency (n)	Percentage (%)
Not in Compliance with Puskesmas TPS Standards	1	16.7
In Compliance with Puskesmas TPS Standards	5	83.3
Total	6	100.0

Based on Table 5, it was found that the majority of TPS facilities and infrastructure at outpatient Puskesmas in the working area of Tuban Regency in December 2024 met the standard criteria, with 5 Puskesmas (83.3%) in compliance. Meanwhile, 1 Puskesmas (16.7%) did not comply with the Puskesmas TPS standards.

Table 6. Cross-tabulation of Puskesmas Unit and TPS Management at Puskesmas in the Working Area of Tuban Regency, 2024

Puskesmas Unit	Pengelolaan TPS				Total		*p-value*
	Not in Compliance with Puskesmas TPS Standards		In Compliance with Puskesmas TPS Standards				
	f	%	f	%	f	%	
Inpatient	2	25.0	6	75.0	8	100	0.615
Outpatient	1	16.7	5	83.3	6	100	
Total	3	21.4	11	78.6	14	100	

Description: *N=25; α=0,05 (5%)*

Based on Table 6, it is shown that TPS management not in compliance with Puskesmas TPS standards occurred in 25.0% of inpatient Puskesmas units, compared to 16.7% of outpatient units. TPS management that complied with the standards was observed in 83.3% of outpatient Puskesmas units, compared to 75.0% of inpatient units. The results of the comparative test, as shown in Table 6, using Fisher's Exact Test, yielded a p-value of 0.615, which is greater than 0.05. This indicates that there is no significant difference in TPS management at Puskesmas in the working area of Tuban Regency in 2024 in accordance with the regulations.

DISCUSSION

Characteristics of Health Centre Waste Storage Officers

The characteristics of temporary waste storage (TPS) officers in both Inpatient and Outpatient Health Centres (Puskesmas) within the working area of Tuban Regency in December 2024 show that all officers were aged between 25 and 54 years, categorised as productive age, with 100% in each group. In terms of gender, almost all TPS officers in Inpatient Health Centres were female (87.5%), while all officers in Outpatient Health Centres were female (100%).

Age is one of the factors influencing individual behaviour, including in medical waste management. Other closely related factors include educational level, type of occupation, knowledge, work experience, and attitude (Hasiu et al., 2024). According to Laksono & Agustina (2021), as a person's age increases, their ability to understand and apply proper medical waste management also tends to improve. Additionally, women are often associated with being more meticulous and diligent, making them more effective in health and hygiene-related programmes (Letho et al., 2021).

Generation of Medical Waste

The highest average amount of medical waste generated in the Tuban Regency area in December 2024 came from Inpatient Health Centres, totalling 139.38 kg. In contrast, Outpatient Health Centres produced an average of 68.83 kg. This aligns with the findings of Rinardi & Maria (2020), who stated that health centres providing inpatient services generally produce more medical waste compared to those without inpatient services. This is also supported by Febriana et al. (2024), who explained that Outpatient Health Centres have a lower waste generation rate due to fewer medical procedures being performed on patients.

Management of TPS in Inpatient Health Centres

The study found that the majority (75%) of Inpatient Health Centres in Tuban Regency had managed their TPS in accordance with the set standards, while the remaining 25% had not yet complied. According to Maliki et al. (2022), solid medical waste in Inpatient Health Centres typically comes from treatment room activities. Improper waste management can negatively affect the health of personnel, with skin irritation (itchiness) reported in 52.33% of cases.

Medical waste has the potential to pollute the environment and pose serious health risks to humans and other living beings (Rochmawati & Dwi, 2022). Aulia et al. (2021) noted that while waste management is generally carried out by health centre staff, many practices still do not comply with Ministry of Health Regulation No. 18 of 2020. Therefore, the active involvement of

health centre staff is essential in all waste management processes, from collection to final disposal (Menteri Kesehatan Republik Indonesia, 2020).

The researcher assumes that substandard medical waste management increases the risk to public health and the environment. For this reason, all health care facilities must comply with applicable regulations, especially Ministry of Environment and Forestry Regulation No. 06 of 2021, concerning technical requirements for hazardous and toxic waste (B3) management based on available TPS infrastructure (Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia, 2021).

Management of TPS in Outpatient Health Centres

Likewise, most Outpatient Health Centres (83.3%) had managed their TPS according to the required standards, with only one centre (16.7%) not in compliance. Nabilla et al. (2024) reported that although the stages of medical waste management—such as sorting, collection, storage, transportation, and destruction—had been implemented, issues remained in the storage and transportation stages. There were still instances of mixing medical and non-medical waste due to limited infrastructure and low awareness among staff. The TPS was also located within the main building, on the second floor near the toilets, which caused an unpleasant odour when the TPS door was open, affecting comfort.

Implications for Medical Waste Management at Health Centres

As the frontline units of the health care system, health centres are required to meet operational standards for both inpatient and outpatient services (Imron & Sri, 2024). Effective medical waste management requires multisectoral collaboration, the development of national policies, and local-level implementation. According to Hondro (2022), a solid legal framework, staff training, and public awareness are key elements for the success of medical waste management systems.

Based on the research findings, the researcher assumes that temporary waste storage facilities in health centres—whether for inpatient or outpatient services—must meet technical standards such as being watertight, enclosed, and easy to clean. Waste containers should be placed according to the needs of each treatment room, and TPS areas must be emptied and cleaned at least once every 24 hours. Waste management officers play a crucial role in monitoring and maintaining cleanliness in the health centre environment.

Differences in TPS Management at Health Centres in Tuban Regency

The findings of this study indicate that, in general, the management of Temporary Waste Storage (TPS) at health centres (Puskesmas) within the Tuban Regency area in 2024 complies with applicable regulations—particularly among non-inpatient Puskesmas. This is because the outpatient health centres included in this study had already obtained SPPL (Environmental Feasibility Statement) permits from the local Environmental Agency. These findings are consistent with the study by Aprianda (2022), which showed that operational hours differ between inpatient and non-inpatient Puskesmas, as does the volume of waste produced. However, no significant differences were found in TPS management, as all medical waste must be managed in accordance with its characteristics and in line with established standards and regulations.

Similarly, Arlinda et al. (2022) found that the proportion of non-sharp infectious waste at both inpatient and outpatient Puskesmas was not significantly different. The main distinction between the two types of facilities lies in the provision of inpatient services, where infusion bottle waste is typically generated. This composition is similar to that found in East and West Surabaya. Measurements taken from seven main Puskesmas and nine auxiliary Pustu units reported the following average waste generation rates: Inpatient = 60.47 g/patient/day, Outpatient = 6.37 g/patient/day, and Pustu = 1.97 g/patient/day.

In line with these findings, this study also found that the highest average volume of medical waste in the Tuban Regency in October 2024 was produced by inpatient Puskesmas units, at 139.38 kg, while outpatient Puskesmas generated an average of 68.83 kg. Temporary waste storage facilities (TPS) in health care settings are typically located near waste generation points for easy access. These facilities are designed to receive and store hazardous and medical waste

until it can be transferred to larger transport vehicles for further processing (Elvira, Alfiyaty, & Syamsir, 2023).

According to Rochmawati & Dwi (2022), IPSPL (Environmental and Facility Maintenance Unit) should enforce stricter supervision over medical waste management practices. This includes ensuring proper waste segregation, securing TPS from unauthorised access, maintaining punctuality in waste handling, and enforcing the use of personal protective equipment (PPE) among waste management staff. Based on the results of this study, the researcher assumes that there is no significant difference in TPS management between inpatient and non-inpatient Puskesmas. In general, all health facilities produce waste—both hazardous and non-hazardous—which must be collected and stored separately in designated rooms. Appropriate safety and security measures must be implemented, including the provision of PPE for staff and regular training, as part of an effective health care waste management strategy.

CONCLUSION

Based on the findings of this study, it can be concluded that the majority of inpatient and outpatient community health centres (Puskesmas) in the Tuban Regency work area in 2024 have facilities and infrastructure for temporary waste storage (TPS) that meet the established standards. A total of 75% of inpatient Puskesmas units and 83.3% of outpatient Puskesmas units have fulfilled these standards, while the remainder—such as Puskesmas Soko, Montong, and Kerek—are still not compliant. Nevertheless, statistical analysis showed no significant difference in TPS management between inpatient and outpatient Puskesmas ($p = 0.615 > 0.05$). In addition, the highest volume of medical waste was generated by inpatient Puskesmas units, with an average of 139.38 kg, while outpatient units produced an average of 68.83 kg.

It is recommended that Puskesmas units that have not yet met TPS standards should promptly make improvements, such as by providing dedicated trolleys for waste transport, developing and implementing standard operating procedures (SOPs) for medical waste handling, and securing temporary storage permits in accordance with Ministry of Health Regulation No. 18 of 2020. These efforts are essential to reduce the volume of medical waste and enhance safety and efficiency in waste management. Furthermore, regular monitoring and evaluation by the local Health Office and Environmental Agency are needed, even for Puskesmas that already meet the standards, to ensure consistency and continuous improvement. Further research is also recommended to explore additional factors related to TPS management that were not covered in this study, including conducting in-depth interviews with TPS officers to produce more objective and comprehensive data.

REFERENCES

Adiputra, I. M. S., Trisnadewi, N. W., Oktaviani, N. P. W., Munthe, S. A., Hulu, V. T., Budiastutik, I., ... & Suryana, S. (2021). Metodologi Penelitian Kesehatan. Medan: Yayasan Kita Menulis. Retrieved from: https://kitamenulis.id/2021/05/08/metodologi-penelitian-kesehatan/

Aprianda, D. (2022). Perencanaan TPS Limbah Medis Fasilitas Pelayanan Kesehatan Puskesmas Kabupaten Asahan, Provinsi Sumatera Utara. *Skripsi*. UIN Ar-Raniry Fakultas Sains dan Teknologi. Retrieved from: https://repository.ar-raniry.ac.id/id/eprint/34708/

Arlinda, V. P., Windraswara, R., & Azinar, M. (2022). Analisis Pengelolaan Limbah Medis. *Jurnal Penelitian Dan Pengembangan Kesehatan Masyarakat Indonesia,* 3(1), 52-61. Retrieved from: https://journal.unnes.ac.id/sju/jppkmi/article/view/61079

Aulia, A. D., Rhomadhoni, M. N., & Syafiuddin, A. (2021). Gambaran Pengelolaan Limbah Medis Padat Di Puskesmas. *Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal*, 11(4), 755-762. Retrieved from: https://journal.stikeskendal.ac.id/index.php/PSKM/article/view/1792/

Badan Pusat Statistik Kabupaten Tuban. (2023). *Kabupaten Tuban Dalam Angka 2023*. Tuban: Badan Pusat Statistik Kabupaten Tuban.

Dinas Kesehatan Kabupaten Tuban. (2024). *Pusat Kesehatan Masyarakat di Kabupaten Tuban*. Dinas Kesehatan Kabupaten Tuban.

Elvira, V. F., Alfiyaty, A., & Syamsir, S. (2023). Evaluasi Sistem Pengelolaan Sampah Medis Padat di UPT Puskesmas Teluk Lingga Kabupaten Kutai Timur. *Buletin Keslingmas,* 42(2), 106-112. https://doi.org/10.31983/keslingmas.v42i2.9865

Febriana, T., Purnama, L. B., Setyoko, S., & Wahyudin, D. (2024). Tinjauan Penanganan Limbah Medis Padat Di Puskesmas Sumbersari Kabupaten Bandung Tahun 2024: Review of Solid Medical Waste Handling at Sumbersari Health Center, Bandung Regency in 2024. *Environmental Health dan Safety Journal*, 1(1), 33-45. Retrieved from: https://jurnal.polkesban.ac.id/index.php/ehs/article/view/2242

Hasiu, T.S., Asrianto, L.O., & Ernianti, E. (2024). Faktor-faktor yang Berhubungan dengan Tindakan Petugas Kesehatan dalam Upaya Pengelolaan Sampah Medis di Rumah Sakit Umum Daerah Kabupaten Buton Utara. *Jurnal Ilmiah Obsgin, 16(1)*, 206-215. Retrieved from: https://stikes-nhm.e-journal.id/JOB/article/view/1773/1580

Husaini, D. C., Bernardez, V., Zetina, N., & Mphuthi, D. D. (2024). Healthcare industry waste and public health: a systematic review. Arab Gulf Journal of Scientific Research, 42(4), 1624-1642. https://doi.org/10.1108/AGJSR-01-2023-0026

Laksono, G. T. P., & Sari, A. (2021). Hubungan Pengetahuan, Sikap dan Ketersediaan Sarana Prasarana dengan Perilaku Pengolahan Limbah Medis oleh Petugas Kebersihan. *Journal of Public Health Education,* 1(1), 40-47. https://doi.org/10.53801/jphe.v1i01.16

Letho, Z., Yangdon, T., Lhamo, C., Limbu, C. B., Yoezer, S., Jamtsho, T., ... & Tshering, D. (2021). Awareness and practice of medical waste management among healthcare providers in National Referral Hospital. *PloS one,* 16(1), e0243817. https://doi.org/10.1371/journal.pone.0243817

Maliki, M., Siregar, Y. I., & Zahtamal, Z. (2022). Kajian pengelolaan limbah medis pada puskesmas di Kabupaten Bengkalis. *SEHATI: Jurnal Kesehatan*, 2(2), 42-52.

Menteri Kesehatan Republik Indonesia. (2020). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 18 Tahun 2020 Tentang Pengelolaan Limbah Medis Fasilitas Pelayanan Kesehatan Berbasis Wilayah.* Jakarta: Menteri Kesehatan Republik Indonesia. Retrieved from: https://peraturan.bpk.go.id/Download/144821/Permenkes%20Nomor%2018%20Tahun%202020.pdf

Menteri Kesehatan Republik Indonesia. (2019). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 43 Tahun 2019 Tentang Pusat Kesehatan Masyarakat*. Jakarta: Menteri Kesehatan Republik Indonesia. Retrieved from: https://peraturan.bpk.go.id/Download/129900/Permenkes%20Nomor%2043%20Tahun%202019.pdf

Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia. (2021). Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia Nomor 6 Tahun 2021 Tentang *Tata Cara dan Persyaratan Pengelolaan Limbah Bahan Berbahaya dan Beracun*. Jakarta: Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia. Retrieved from: https://peraturan.bpk.go.id/Download/205145/permen%20LHK%20No.%206%20tahun%202021.pdf

Munir, M., Kurnia, D.P.S., Suhartono, S., Nurus, S., & Utami, A.P. (2022). *Metode Penelitian Kesehatan*. Tuban: Penerbit CV. Eureka Media Aksara. Retrieved from: https://repository.penerbiteureka.com/media/publications/453681-metode-penelitian-kesehatan-0bf14b9a.pdf

Nabilla, M., Herniwanti, H., & Susanto, Y. (2024). Analisis Pengelolaan Limbah Medis Padat Di Puskesmas Bangkinang Kota. *Jurnal Kesehatan Tambusai*, 5(1), 643-655. Retrieved from: https://journal.universitaspahlawan.ac.id/index.php/jkt/article/view/24642

Nwachukwu, N. C., Orji, F. A., & Ugbogu, O. C. (2013). Health care waste management–public health benefits, and the need for effective environmental regulatory surveillance in federal Republic of Nigeria. *Current topics in public health*, 2, 149-178. https://doi.org/10.5772/53196

Rinardi, H. C., & Anityasari, M. (2021). Perbaikan Sistem Penyimpanan Sementara dan Pengangkutan Limbah Medis pada Pusat Kesehatan Masyarakat Kota Surabaya. *Jurnal Teknik ITS,* 9(2), E239-E245. https://doi.org/10.12962/j23373539.v9i2.56433

Rochmawati Ema Syarifah & Dwi Faqihatus Syarifah Has. (2022). Analisis Pengelolaan Limbah Medis Padat di Rumah Sakit Medika Mulia Tuban. Journal of Public Health Science Research (JPHSR), 3(2), p. 1-14. doi: 10.30587/jphsr.v1i1.1178. (Accessed: 10 August 2024).

Rochmawati, E. S., Has, D. F. S., KM, S., & Epid, M. (2023). Analisis pengelolaan limbah medis padat di rumah sakit medika mulia Tuban. *Journal of Public Health Science Research (JPHSR),* 3(2), 13-26.