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A STUDY OF WASTEWATER MANAGEMENT AT COT SEUMEUREUNG AND PEUREUMEU COMMUNITY HEALTH CENTERS WEST ACEH REGENCY

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Abstract

As healthcare facilities, community health centers (puskesmas) generate wastewater that contains pathogenic microorganisms, hazardous chemicals, and toxic substances, which have the potential to pollute the environment and pose risks to public health if not managed according to standards. Although the Ministry of Health Regulation No. 7 of 2019 mandates that every puskesmas should have a functioning Wastewater Treatment Plant (IPAL), many puskesmas in West Aceh District, including Puskesmas Cot Seumeureung and Peureumeu, have not yet operated their IPAL optimally. This study aims to assess the wastewater management at these two puskesmas and the role of the West Aceh Health Office in supervision and guidance. The research employs a descriptive qualitative approach, using data collection techniques such as interviews, observations, and documentation from seven informants at both puskesmas and the Health Office. The data were analyzed through reduction, presentation, and conclusion drawing. The findings indicate that at Puskesmas Cot Seumeureung, only some rooms are connected to the IPAL due to limited pipeline infrastructure, while at Puskesmas Peureumeu, pipe leaks that have remained unrepaired for two years were found. Additionally, the monitoring of water quality and maintenance of the IPAL at both puskesmas are still minimal, with pH test results frequently exceeding the standard limits. The management of wastewater at these puskesmas remains suboptimal, requiring improvements in infrastructure, regular monitoring, and capacity-building for human resources.

Keywords: Wastewater Management, Puskesmas, IPAL

Introduction

Waste management is an effort to reduce the volume, concentration, or hazard of waste through physical, chemical, or biological processes after production. The first step in waste management is prevention by reducing waste at its source and utilizing the waste produced (A. Pruss, 2005). Wastewater treatment in community health centers (puskesmas) is an important step in maintaining environmental cleanliness and preventing disease transmission.

Poor wastewater management can negatively impact environmental quality and public health. According to the Ministry of Health of the Republic of Indonesia, wastewater is all liquid waste, including fecal matter, originating from hospital activities that may contain microorganisms, toxic chemicals, and radioactive substances hazardous to human health (Ministry of Health, 2004). Therefore, wastewater management that meets established standards is essential to protect public health and preserve the environment. Previous studies indicate that consuming water contaminated with wastewater can inhibit children's growth, influence human behavior, and create breeding sites for disease vectors such as malaria mosquitoes (Dwita & Zamroni, 2021).

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The Minister of Health Regulation No. 7 of 2019 stipulates that all healthcare facilities, including puskesmas, are required to have a properly functioning Wastewater Treatment Plant (IPAL) and conduct periodic monitoring of wastewater quality to ensure that discharged wastewater meets environmental quality standards. However, observations at Cot Seumeureung and Peureumeu Community Health Centers show that IPAL management in both facilities is still not optimal. Waang et al. (2016) also emphasize that in situations where IPAL systems malfunction, healthcare facilities must have alternative mitigation and waste management systems that comply with regulations and receive oversight from authorized institutions. Therefore, strengthening reporting systems and periodic evaluations is necessary to ensure more effective and sustainable wastewater management in puskesmas.

Cot Seumeureung and Peureumeu Community Health Centers in West Aceh Regency face several challenges in managing the wastewater generated from their daily medical services. A major problem in both puskesmas is the limited pipe network, which results in only some rooms being connected to the IPAL system. Other wastewater is directed to temporary holding tanks similar to septic tanks without adequate treatment. At Peureumeu Community Health Center, a wastewater pipe leakage has remained unrepaired for two years, and routine monitoring of wastewater quality is not conducted, making this a significant issue.

The wastewater produced by these puskesmas has diverse characteristics depending on its source and is categorized into three types. First, infectious wastewater, which is associated with medical procedures such as microbiological examinations from polyclinics, inpatient wards, and infectious disease units. Second, domestic wastewater, which consists of wastewater not originating from medical procedures, such as from bathrooms, toilets, kitchens, and similar facilities. Third, chemical wastewater, which comes from the use of chemicals in medical services, laboratories, sterilization units, and research activities (Chandra, 2007) in (Menik Mustika Wahyuningrum Surya Putri et al., 2016).

This study uses a qualitative approach to explore in depth the wastewater management practices at Cot Seumeureung and Peureumeu Community Health Centers. The focus of the research is to understand the technical challenges faced by both puskesmas in managing their IPAL systems and to evaluate the role of the West Aceh District Health Office in supervision and guidance.

The main objective of this study is to qualitatively explore the issues faced by Cot Seumeureung and Peureumeu Community Health Centers in wastewater management and to provide recommendations for improving IPAL management effectiveness in both facilities.

Methods

Qualitative research is based on post-positivism and carried out under natural conditions. The researcher serves as the main instrument, data are collected through triangulation, the analysis is inductive, and the results focus on meaning rather than generalization (Sugiyono, 2020).

This study aims to explore an in-depth understanding of wastewater management at Cot Seumeureung and Peureumeu Community Health Centers, as well as the role of the West Aceh District Health Office in supervision and guidance. The research locations include the two health centers and the West Aceh District Health Office, with a sample consisting of seven informants selected through purposive sampling, including environmental health officers and related staff.

Data collection was conducted through in-depth interviews, direct observations, and documentation using instruments such as interview guidelines, audio recorders, and cameras. According to Sugiyono (2020), the collected data were analyzed using reduction, presentation, and conclusion drawing techniques in accordance with qualitative analysis principles. Data triangulation was conducted to ensure validity and reliability, while member checking and peer debriefing were

used to enhance the credibility of the findings (Sugiyono, 2020). Although this study is limited by the number of informants and time constraints, the qualitative approach was chosen to provide deeper insights into the challenges and potential solutions for wastewater management in the two community health centers

Results

1. Wastewater Management at Cot Seumeureung Community Health Center

Cot Seumeureung Community Health Center, located in Samatiga Subdistrict, West Aceh Regency, is a 24-hour inpatient facility that has been operating since 2006 and began providing inpatient services in 2014. To maintain environmental health, this health center has installed a Wastewater Treatment Plant (IPAL) in 2024, located near staff housing and away from patient service rooms. This setup aligns with the Ministry of Health Regulation No. 7 of 2019, which requires all healthcare facilities to manage wastewater to prevent environmental contamination. The problems identified at this health center include:

a). Limited Pipe Network

Findings show limitations in the pipeline system, resulting in only a few rooms being connected to the IPAL, namely the inpatient room, emergency room (IGD), and laboratory. Below is the response to the question: "How does the collection tank manage wastewater from all rooms, and are they all connected to the IPAL at Cot Seumeureung Health Center?

"Not all rooms are connected to the IPAL only three rooms: the inpatient room, the emergency room, and the laboratory. Currently, the health center is undergoing new construction, so it's difficult to install pipes to other rooms. The pipes would need to go around the new building first, and the distance to the IPAL is quite far, so wastewater from other rooms is directed into a temporary holding tank similar to a septic tank." (Informant 1, Environmental Health Officer).

"*There are obstacles with the pipeline, so not all rooms are connected to the IPAL only the inpatient room and the emergency room are connected because the IPAL is located far behind the building.*" (Informant 2, Sanitation Supervisor).

b) Wastewater Quality Monitoring

Findings also indicate discrepancies in wastewater pH levels. Earlier tests showed normal pH values, but in 2024 the pH increased to above 8.5-9, exceeding the permitted standard. This indicates disturbances in the IPAL process and potential environmental contamination. Below is the response to the question: "Which parameters are tested in the laboratory for recycled water at this health center?"

"*We check the pH and use a photometer. Every month we submit data to SIKELIM, which asks for the pH value. We check the wastewater pH in the control tank. It used to be normal for 1–2 months, and in 2024 the pH was still normal, but starting the next months until now, the pH has been above 8.5–9 and no longer normal.*" (Informant 1, Environmental Health Officer).

"*We checked the pH before, but for now we haven't checked it again*." (Informant 2, Sanitation Supervisor).

c) Treatment Process and Maintenance

Challenges in the treatment process and maintenance of the IPAL at Cot Seumeureung include issues with the control tank, which lacks adequate outflow due to the outlet pipe being positioned too high. As a result, the settled water cannot flow out into the environment. Below is the response to the question: "How is the sedimentation process carried out during temporary wastewater storage in the IPAL?"

"*The wastewater is still settling in the control tank, and there is no outflow yet because the outlet pipe was installed too high, making it difficult for the water to exit to the environment. Until now,*

the water remains stagnant in the control tank." (Informant 1, Environmental Health Officer).
"*The wastewater has been stagnant there for a long time*." (Informant 2, Sanitation Supervisor).

Overall, although Cot Seumeureung Community Health Center already has an IPAL and carries out some wastewater treatment processes, the implementation is not fully aligned with the Ministry of Health Regulation No. 7 of 2019. Technical issues, limited quality monitoring, and irregular maintenance indicate the need for improvements in wastewater management. Technical support and supervision from relevant authorities are essential to ensure that the IPAL functions optimally, meets quality standards, and effectively protects public health and the surrounding environment.

2. Wastewater Management at Peureumeu Community Health Center (Puskesmas)

Peureumeu Community Health Center, located in Kaway XVI Subdistrict, West Aceh Regency, is a 24-hour inpatient facility and has used a Wastewater Treatment Plant (IPAL) since 2018. The wastewater generated comes from activities in bathrooms, sinks, the emergency room (UGD), inpatient rooms, the main building, and polyclinic rooms. However, its management is not yet fully aligned with the Ministry of Health Regulation No. 7 of 2019, as some rooms remain unconnected to the IPAL system, even though the regulation requires all service areas to be connected to prevent environmental contamination. The findings from interviews with Informant 1 (Environmental Health Officer) and Informant 2 (Environmental Sanitation Staff) are as follows:

a). Pipe Leakage

Leakage in the pipeline from the emergency room has been left unrepaired for two years, causing wastewater to not fully enter the IPAL system. This creates risks of environmental contamination and reduces the effectiveness of wastewater management. Below is the response to the question: "How does the collection tank manage wastewater from all rooms are they all connected to the IPAL in this health center?"

"*From the polyclinic, main building, and inpatient rooms, wastewater is collected in a tank, and once the tank is full, it flows into the IPAL automatically. But right now, the pipeline from the emergency room is leaking because it was damaged by materials from the main building renovation. It's still leaking, and it hasn't been fixed for two years*." (Informant 1, Environmental Health Officer).

"*Most rooms are connected to the IPAL, except for non-service rooms such as the environmental health room and health promotion room*." (Informant 2, Environmental Sanitation Staff).

b). Not all rooms are connected to the IPAL system

The findings indicate that not all rooms are connected to the wastewater treatment system. Only the polyclinic, main building, and inpatient units are connected, and this condition significantly affects the overall wastewater management process. The following question relates to this: How does the storage tank mechanism collect wastewater from all rooms are all rooms connected to the wastewater treatment system at this health center?

"*From the polyclinic, main building, and inpatient rooms, wastewater is collected in a tank, and if the tank is full, it flows automatically to the IPAL. But right now, the emergency room pipeline is leaking because of materials dropped during the building renovation, and it has remained leaking for two years*." (Informant 1, Environmental Health Officer).

"*Most rooms are connected to the IPAL, but rooms like the environmental health room and health promotion room are not because they are not service units*." (Informant 2, Environmental Sanitation Staff).

c). Wastewater Quality Monitoring

Wastewater quality monitoring at Peureumeu Community Health Center is not conducted routinely and is limited to occasional pH checks which have not been performed recently. The

lack of monitoring increases the risk of environmental contamination, disease transmission, system malfunction, and non-compliance with regulations. Below is the response to the question: "Which parameters are tested in the laboratory for recycled wastewater at this health center?"
"*We have checked pH before, but currently we have not conducted another pH check because the discharge of wastewater is minimal*."(Informant 1, Environmental Health Officer).
"*We haven't checked the pH yet*." (Informant 2, Environmental Sanitation Staff).

Overall, although Peureumeu Community Health Center already has a Wastewater Treatment Plant (IPAL) and most of its rooms are connected, the implementation of wastewater management is still far from optimal. The problems encountered include leakage in the emergency room pipeline, ineffective sedimentation processes, irregular water-quality monitoring, infrequent maintenance of the treatment unit, and the absence of technical documentation. These conditions clearly do not comply with the Indonesian Ministry of Health Regulation No. 7 of 2019, therefore technical improvements, regular maintenance, and stricter supervision from the relevant authorities are needed to ensure that the IPAL can function optimally and prevent environmental pollution.

3. The Role of the West Aceh District Health Office in Supervision and Guidance

The West Aceh District Health Office plays an important role in managing wastewater at community health centers, particularly Cot Seumeureung and Peureumeu Health Centers, through their Wastewater Treatment Plants (IPAL). In accordance with the Ministry of Health Regulation No. 7 of 2019, the Health Office is responsible for ensuring that every healthcare facility, including community health centers, manages wastewater properly to prevent environmental pollution. Interviews revealed several issues, which are described as follows:

a). Challenges in Supervision and Evaluation

The challenges identified include delayed reporting and limited funding. The question asked was: "How does the Health Office manage situations where a community health center does not have an IPAL?"
"*For now, we temporarily manage it by creating a holding tank similar to a septic tank, like the one at Meureubo Community Health Center*."(Informant 1, Environmental Health Officer)
"*If there is no IPAL, we propose it in the budget plan. If funds are available in the following year, construction will be carried out because every community health center that handles wastewater must have an IPAL*."(Informant 2, Environmental Health Staff)
"*Here, we collaborate with the Environmental Agency (DLH) to optimize IPAL operations in each health center*."(Informant 3, Division Head).

b). Strengthening Supervision and Coordination

There is a need to strengthen supervision and coordination with cross-sectoral agencies, including the Environmental Agency (DLH). The following question relates to this: How does the District Health Office manage health centers that do not have a Wastewater Treatment Plant (IPAL)?
"*For now, we temporarily manage it by creating a holding tank similar to a septic tank*." (Informant 1, Environmental Health Officer).
"*If there is no IPAL, we propose it in the budget plan. If funds are allocated for the following year, then construction will be carried out. Every health center must have an IPAL*." (Informant 2, Environmental Health Staff).
"*We work closely with the Environmental Agency (DLH) to maximize the use of IPAL in every health center*." (Informant 3, Division Head).

c). Challenges in Guidance and Education

Challenges also arise regarding the awareness and involvement of health center staff in implementing proper wastewater management according to standards. Below is the response to the question: "What are the main obstacles for the Health Office in providing guidance or supervision for IPAL management at health centers?"

"*There are no significant obstacles, but the Health Office continues to provide supervision, assistance, guidance, and evaluation by monitoring the health centers. Sometimes the obstacle lies with the head of the health center for example, if they do not report issues related to damaged IPAL units or if there is no available funding. If the health center can still operate their IPAL using their own allocated funds, it is not a problem, but most health centers do not have sufficient funds*." (Informant 1, Environmental Health Officer).

"*The obstacle is at the health center level some staff are late in reporting problems that occur*."(Informant 2, Environmental Health Staff).

"*When we observe the issues, particularly in distant health centers, staff tend to think wastewater management is not very important. Even though we have provided education, they still underestimate wastewater management, assuming the wastewater will just flow wherever*."(Informant 3, Division Head).

Overall, despite efforts by the West Aceh Health Office to conduct supervision, guidance, and evaluation, challenges remain, both technically and in terms of staff awareness at community health centers. To comply with Indonesian Minister of Health Regulation No. 7 of 2019, a more disciplined reporting system, strengthened cross-sectoral coordination, especially with the Environmental Agency (DLH), and increased capacity at community health centers to manage wastewater treatment plants independently are needed.

Discussion

1. Cot Seumeureung Community Health Center (Puskesmas)

a. Issues in Wastewater Management

1). Limited Pipe Network

Field findings show that wastewater management at Cot Seumeureung Community Health Center is not yet optimal, even though it is equipped with a large-capacity biofilter Wastewater Treatment Plant (IPAL). The volume of wastewater entering the IPAL is only around 1 liter per day far below the designed capacity. This discrepancy indicates a mismatch between IPAL capacity planning and the actual conditions of wastewater management in the field.

One of the main causes of this mismatch is the limited pipeline network, where only three rooms are directly connected to the IPAL. Other rooms still discharge wastewater into temporary holding tanks or septic-tank like structures without treatment. This condition shows that the available IPAL system does not function in an integrated manner for all wastewater sources generated by the facility. As a result, wastewater from rooms not connected to the IPAL has the potential to contaminate the environment both soil and groundwater because it is discharged without prior treatment. According to Nursyamsi et al. (2017) in Hidayat, Suparni & Komalaningsih (2023), wastewater from community health centers can act as a medium for the spread of diseases among staff, patients, and surrounding communities, making environmental management crucial.

The World Health Organization (2014) states that wastewater management in healthcare facilities must be fully integrated, ensuring that all sources of wastewater are channeled into an appropriate treatment system to prevent environmental contamination and disease transmission.

The fact that not all rooms are connected to the IPAL contradicts this principle. Additionally, inappropriate planning of IPAL capacity without considering actual pipeline distribution conditions leads to inefficient use of the treatment system. These findings are consistent with Mirawati et al. (2019), who reported that weaknesses in technical aspects and distribution networks are major factors contributing to poor IPAL performance in healthcare facilities.

2). Wastewater Quality Monitoring

Monitoring results show that wastewater pH values exceed normal levels (> 8.5–9). This surpasses the wastewater quality standards set by the Ministry of Health Regulation No. 7 of 2019, which requires pH levels to remain within the acceptable range to prevent environmental damage. Wastewater with high pH can cause several environmental impacts, including: disrupting aquatic ecosystems, as aquatic organisms are sensitive to extreme pH changes, which can result in organism death or biological disturbances.

Lowering groundwater quality around the healthcare facility, which risks affecting community drinking water sources. reducing the efficiency of IPAL processes, especially in biological treatment systems, because microbial decomposers operate effectively only within specific pH ranges. To ensure safe and effective wastewater treatment, an IPAL must be properly designed, operated, and maintained (Samina et al., 2013) in (Komarudin et al., 2023). However, findings show that follow-up actions for abnormal pH results have not been carried out effectively, indicating weak monitoring and quality control at Cot Seumeureung Community Health Center.

3). Treatment Process and Maintenance

The wastewater treatment process at Cot Seumeureung Community Health Center especially the sedimentation stage has not functioned optimally due to technical issues in the control tank. The outlet pipe is positioned too high, preventing treated water from flowing out properly. As a result, wastewater accumulates and stagnates in the control tank. This condition inhibits effective separation between solid and liquid waste, and can cause unpleasant odors and microbial growth that contaminate the environment around the IPAL.

This issue does not comply with the Ministry of Health Regulation No. 7 of 2019, which requires every healthcare facility to treat wastewater until it meets quality standards before being discharged. The regulation also emphasizes the importance of proper IPAL design and maintenance to ensure that each treatment stage, including sedimentation, operates effectively. Previous studies confirm that poor wastewater management in healthcare facilities can increase the risk of occupational hazards and infection transmission among staff and patients (A.H. Putri, 2018) in (Rawdhotul Rahmi & Susanto, 2024).

b. Recommended Solutions

To address these issues, several solutions are recommended:

1. Evaluation of IPAL Design Conduct a thorough review of IPAL capacity and design to ensure it aligns with the actual volume of wastewater and its characteristics.
2. Repair and Expansion of the Pipeline Network Expand the pipeline network so that all rooms are connected to the IPAL in an integrated manner, in accordance with World Health Organization (2014) principles.
3. Intensive Wastewater Quality Monitoring Increase the frequency and scope of wastewater quality monitoring, including pH and other parameters, at least once a month as required by the Ministry of Health Regulation No. 7 of 2019. Follow up on monitoring results with corrective actions, such as adjusting treatment processes or adding pH adjustment units if needed.
4. Enhancement of Human Resource Capacity and Operational Management Provide technical

training for wastewater management officers to ensure optimal and procedural IPAL operation.

2. Peureumeu Community Health Center (Puskesmas)

a. Issues in Wastewater Management

1). Unrepaired pipe leakage

Observations reveal that the pipeline at Peureumeu Community Health Center has been leaking for more than two years. This indicates weak technical maintenance in the wastewater management system. Pipe leaks can cause untreated wastewater to escape into the environment before reaching the IPAL, increasing soil and groundwater contamination risks.

Additionally, long-standing leaks accelerate pipeline deterioration, reduce flow pressure and discharge to the IPAL, and disrupt overall treatment effectiveness. According to Goni (2021) in Fachruddin Azwari et al. (2023), clarification/sedimentation tanks in IPAL units are crucial for reducing Total Suspended Solids (TSS). High TSS levels contribute to higher pollution in water bodies (Manik, 2003) in (Tony Kurtis Timpua & Robinson Pianaung, 2019).

The condition contradicts World Health Organization (2014) guidelines, which emphasize secure and complete connection of all wastewater sources to integrated treatment systems to prevent contamination and disease transmission. The leakage also disrupts wastewater-quality monitoring because leaked wastewater is not captured in sampling. This is inconsistent with the Ministry of Health Regulation No. 7 of 2019, which requires monthly wastewater monitoring to ensure compliance with quality standards.

2). Not all rooms are connected to the IPAL

Findings show a mismatch between IPAL capacity and the actual volume of wastewater being treated. The IPAL at Peureumeu Community Health Center has a large capacity, but the amount of wastewater entering it is significantly below the designed load. This indicates: inaccurate IPAL capacity planning not based on real wastewater discharge, or underutilization of the IPAL due to incomplete pipeline connections.

In many biological IPAL systems, a wastewater load that is too low disrupts microbial activity, affecting treatment performance and causing inconsistent effluent quality. World Health Organization (2014) requires that all wastewater-generating rooms in healthcare facilities be connected to an integrated treatment system to ensure optimal and stable treatment performance. The Ministry of Health Regulation No. 7 of 2019 also mandates routine wastewater-quality monitoring to measure treatment effectiveness. These findings mirror those of Mirawati et al. (2019), who found that weak technical maintenance and lack of monitoring were major factors behind poor IPAL performance in healthcare facilities.

3). Wastewater Quality Monitoring

Wastewater-quality monitoring at Peureumeu Community Health Center is not carried out regularly and is limited to occasional pH checks, which have not been done recently. This insufficient monitoring poses risks such as: environmental contamination, disease transmission, damage to the IPAL system, regulatory non-compliance, and inability to detect changes in effluent quality.

According to the Ministry of Health Regulation No. 7 of 2019, wastewater-quality testing must include multiple parameters pH, temperature, BOD, COD, TSS, oil and grease, ammonia, and coliform to ensure compliance with environmental standards. Therefore, routine and comprehensive laboratory testing is necessary to evaluate IPAL effectiveness and ensure proper wastewater management.

b. Recommended Solutions

Based on the analysis of findings and supporting literature, several recommended solutions can improve wastewater management at Peureumeu Community Health Center:

1. Evaluation of IPAL Design Reassess the IPAL design and capacity to ensure alignment with the actual wastewater volume and all existing sources.
2. Pipeline Repair Immediately repair long-standing pipe leaks and ensure that all rooms are connected to the IPAL system, in accordance with World Health Organization (2014) standards.
3. Enhanced Wastewater Quality Monitoring Conduct regular and consistent monitoring at least once a month as stated in the Ministry of Health Regulation No. 7 of 2019. Monitoring should include pH, BOD, COD, and other essential parameters. Follow up deviations with corrective measures.
4. Strengthened Management and Technical Maintenance Implement routine inspections of pipelines and IPAL units, and enhance the technical skills of staff responsible for wastewater treatment operations.

3. West Aceh District Health Office

a. Issues in Supervision and Guidance

1). Challenges in Supervision and Evaluation

The West Aceh District Health Office plays a crucial role in ensuring that wastewater management across 13 community health centers meets standards through supervision, evaluation, and guidance. However, discrepancies remain between policy and actual implementation. Limited budgets and irregular reporting from health centers make supervision mostly reactive only conducted after problems arise rather than through regular evaluations. This highlights weaknesses in the reporting system and long-term monitoring.

2). Strengthening Supervision and Coordination

Some IPAL units that were previously built are no longer functioning and not being used. As a result, new IPAL procurement occurs repeatedly each year. This indicates: a lack of long-term management strategies, inadequate maintenance, and weak technical planning. Nonfunctional IPAL systems lead to untreated wastewater being discharged into surrounding environments.

This poses significant pollution risks. Metcalf & Eddy (2003) state that wastewater from healthcare facilities contains harmful physical, chemical, and biological components that can threaten public health if not properly treated. Similarly, Mirawati et al. (2019) emphasize that poor technical maintenance and insufficient monitoring are major factors contributing to low IPAL performance in healthcare facilities. These findings indicate that issues extend beyond infrastructure, involving broader managerial and supervisory weaknesses.

3). Challenges in Guidance and Education

The main challenge in guiding and educating staff about IPAL management is the low awareness and engagement among health center personnel. Although the District Health Office performs supervision, assistance, and evaluation, the process is often hindered by lack of timely reports from health centers, unreported IPAL damage, limited funds at the health center level, and staff perceiving wastewater management as unimportant. Some staff still underestimate wastewater management, assuming that wastewater will simply "flow away somewhere," despite educational efforts from the Health Office.

This shows that guidance has not been fully effective, contrary to the requirements of the Ministry of Health Regulation No. 7 of 2019, which mandates proper wastewater management procedures and continuous oversight. To improve compliance, the Health Office must

strengthen: staff awareness, reporting systems, and budget support for wastewater management improvements.

b. Recommended Solutions

To improve the current conditions, several actions can be taken by the West Aceh District Health Office, including:

1. Strengthening the reporting system and regular evaluations Health centers must provide systematic and timely reports to the District Health Office so that supervision becomes proactive rather than reactive.
2. Cross-sector coordination with the Environmental Agency (DLH) Strengthening collaboration with the DLH ensures that wastewater management complies with relevant regulations (Government Regulation No. 22 of 2021 concerning Environmental Protection and Management Guidelines).
3. Enhancing human resource capacity Provide advanced training on wastewater and IPAL management, enabling staff to independently perform routine maintenance and monitoring.
4. Long-term planning for IPAL management Establish strategies to prevent repeated damage and waste of budgetary resources.

Recommendations

1. Improvement of IPAL Infrastructure

To enhance wastewater management effectiveness, improvements must be made to IPAL infrastructure, particularly by expanding the pipeline network so that all rooms in the health center are connected to an integrated treatment system. Existing pipes must also be repaired to prevent leaks and ensure proper wastewater flow.

2. Routine Maintenance and Quality Monitoring

IPAL systems must undergo continuous and routine maintenance, involving trained technical personnel and accredited laboratories for periodic monitoring of wastewater quality. This practice helps maintain compliance with standards, identify issues early, and prevent environmental and health impacts.

3. Strengthening Human Resource Capacity

Human resources at community health centers must receive more comprehensive training on wastewater management and relevant regulations. This training is essential to increase staff knowledge and skills so that wastewater management can be conducted effectively and efficiently.

4. Enhanced Supervision and Guidance by the District Health Office

The West Aceh District Health Office must improve supervision and guidance, including strengthening clear reporting systems and conducting regular evaluations of wastewater management at health centers. Collaboration with the Environmental Agency (DLH) must be optimized to ensure compliance with the Ministry of Health Regulation No. 7 of 2019.

5. Improved Coordination and Collaboration

Coordination among key agencies health centers, the District Health Office, and the Environmental Agency (DLH) must be enhanced to ensure effective and environmentally friendly wastewater management. Cross-sector collaboration facilitates problem-solving and increases awareness and discipline in regulatory implementation.

Conclusion

Wastewater management at Cot Seumeureung and Peureumeu Community Health Centers in West Aceh Regency is not yet optimal, despite having Wastewater Treatment Plants (IPAL) in accordance with regulations. The main issues identified include limited pipeline networks, where only certain rooms are connected to the IPAL, as well as inadequate maintenance and insufficient wastewater-quality monitoring. Untreated wastewater from unconnected rooms is discharged into temporary holding tanks that do not meet treatment standards. These findings highlight inconsistencies between planned IPAL capacity and actual field conditions, as well as a lack of follow-up on abnormal pH levels that exceed acceptable limits. Additionally, the role of the West Aceh District Health Office in supervision and guidance remains limited, resulting in gaps between policy and implementation.

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