

INCREASING PUBLIC KNOWLEDGE REGARDING HEALTHY SANITATION AND DRAINAGE CHANNEL IMPROVEMENT AS A TB PREVENTION STRATEGY

Muhamad Khafid ¹, Dyah Ika Krisnawati ^{2*}, Abdul Hakim Zakkiy Fasya ³

^{1,2} Department of Nursing, Faculty of Nursing and Midwifery

³ Department of Public Health, Faculty of Public Health

Universitas Nahdlatul Ulama Surabaya

Jl. Raya Jemursari No.57, Jemur Wonosari, Wonocolo, Surabaya, Jawa Timur 60237, Indonesia

Email: dyahika@unusa.ac.id

Abstract

Poor drainage systems in densely populated areas contribute to increased humidity and the growth of pathogenic microorganisms, which indirectly affect the risk of TB infection. Stagnant water caused by clogged drainage channels can be a source of various infectious diseases, including respiratory infections. Furthermore, unhealthy environmental conditions can weaken the immune system, making people more susceptible to TB infection. In RT 22 RW 02, an investigation revealed that household wastewater disposal is still inadequate. The densely populated area means residents no longer have the space to build infiltration wells for their household wastewater. To dispose of household wastewater, residents channel wastewater into a puddle that lacks a secondary drainage system, resulting in wastewater accumulating there. As can be imagined, this puddle emits an unpleasant odor and can become a breeding ground for mosquitoes and pathogens, seriously threatening residents' health. Even when it rains, water from the puddle overflows onto the road, producing an unpleasant odor. The goal of this community service activity is to increase residents' understanding of healthy environmental sanitation, particularly regarding household wastewater disposal, and to work with residents to improve drainage for household waste disposal. During 3 months, from May-July 2025, the community services of a lecturer from Universitas Nahdlatul Ulama Surabaya (Unusa), together with community self-help, we succeeded in building a 150-meter-long drainage system for disposing of household waste into the nearest river so that there is no more stagnant waste that produces an unpleasant odor.

Keywords: Drainage, TBC, Wastesater, Environmental, Polution

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, which primarily attacks the lungs but can spread to other organs. This disease is a major public health problem in Indonesia, especially in areas with high population density and poor sanitation. Environmental factors, such as inadequate ventilation, high humidity, and poorly functioning drainage systems, can increase the risk of TB transmission (WHO, 2023). Although effective

and free treatment is available, many patients still face various challenges in completing therapy, including a lack of understanding of the disease, low socio-economic conditions, and strong social stigma (Yunus et al., 2021). Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*, which primarily attacks the lungs but can also spread to other organs. This disease is closely related to socio-economic factors, such as malnutrition, poverty, and limited access to health services (Lönnroth et al., 2010). One of the main obstacles in handling TB is patient compliance with long-term treatment that takes at least six months. Non-compliance with treatment can lead to drug resistance, increase the risk of disease spread, and increase morbidity and mortality rates due to TB (Migliori et al., 2018).

Some of the main challenges faced by TB patients in the community include: Lack of Education about TB Where many patients and the general public still do not understand the symptoms, how it is transmitted, and the importance of completing treatment therapy, Nutritional Limitations, Where TB patients often experience malnutrition which can slow the healing process and increase the risk of complications (Cegielski, J. P., & McMurray, 2004), and Psychosocial Impact and Stigma, Where Stigma towards TB patients is still high in the community, resulting in social isolation and psychological stress for patients (Courtwright, A., & Turner, 2010).

Poor drainage systems in densely populated areas contribute to increased humidity and the growth of pathogenic microorganisms, which indirectly affect the risk of TB infection. Stagnant water caused by clogged drainage channels can be a source of various infectious diseases, including respiratory infections. Furthermore, unhealthy environmental conditions can weaken the immune system, making people more susceptible to TB infection (Ministry of Health of the Republic of Indonesia, 2022).

Clogged drains can indirectly contribute to the increase in TB cases, although they are not a direct cause. There are several mechanisms by which clogged drains can be linked to the spread of TB, including:

1. Increased Risk of Other Infections

Clogged sewers become breeding grounds for mosquitoes and bacteria that cause other diseases such as dengue fever, diarrhea, and leptospirosis. These diseases can weaken a person's immune system, making them more susceptible to *Mycobacterium tuberculosis* infection and at risk of developing active TB.

2. Poor Air Quality

Clogged sewers often cause unpleasant odors and increase air pollution levels in residential areas. Air pollution can damage the lungs and respiratory tract, contributing to susceptibility to respiratory diseases such as TB.

3. Unhealthy and Densely Populated Environments

Areas with poor sanitation and clogged sewers are usually densely populated areas with poor home ventilation. This increases the risk of TB transmission because bacteria can more easily survive and spread in these conditions.

Although TB is not transmitted through dirty water in sewers, an unhealthy environment caused by clogged sewers can exacerbate the risk factors that contribute to its spread. Therefore, efforts to improve drainage channels as part of a community service

program aim to create a healthier environment and reduce the risk of TB spread. These improvements include cleaning drainage channels, improving wastewater disposal systems, and educating the community about the importance of sanitation and environmental cleanliness. Through this approach, it is hoped that there will be a decrease in TB incidence and an improvement in the quality of life for residents in densely populated areas.

A. Situational Analysis

One of the 23 villages in Manyar District, Gresik Regency, East Java, is Sembayat Village. This village may be vulnerable to flooding due to its location on the banks of the Bengawan Solo River. In 2023, Manyar District had approximately 118,437 residents living in 23 villages, including Sembayat Village. Although there is no specific information available regarding RT 22 RW 02 in Sembayat Village, several efforts have been made to improve the health of the village community. For example, Community Service Program (KKN) students from Semen Indonesia International University (UISI) conducted various initiatives in Sembayat Village in 2023. These programs included "fun play" training at SDN 46 Gresik, content design training for village MSMEs, chili planting outreach, and the preparation of a database of over 5,000 village community members to support the management of the SIAP Village website.

In RT 22 RW 02, an investigation revealed that household wastewater disposal is still inadequate. The densely populated area means residents no longer have the space to build infiltration wells for their household wastewater. To dispose of household wastewater, residents channel wastewater into a puddle that lacks a secondary drainage system, resulting in wastewater accumulating there. As can be imagined, this puddle emits an unpleasant odor and can become a breeding ground for mosquitoes and pathogens, seriously threatening residents' health. Even when it rains, water from the puddle overflows onto the road, producing an unpleasant odor.



Figure 1 Unhealthy drainage

B. Objectives

The goal of this community service activity is to increase residents' understanding of healthy environmental sanitation, particularly regarding household wastewater disposal, and to work with residents to improve drainage for household waste disposal.

Besides their unsightly appearance, these puddles emit an unpleasant odor and can become breeding grounds for mosquitoes and pathogens, which seriously threatens residents' health.

C. Solution

Some residents already realize that this condition is very unhealthy. They have frequently discussed this issue but have not yet identified a solution. After reviewing the situation, the author finally arrived at a solution: building a drainage system that can channel the stagnant water to the nearest river, which can then be channeled to the sea. The drainage channel leading to the river has been identified (Figure 3) and has also designed the drainage channel (Figure 4) to determine the amount of raw materials needed. However, building such drainage will undoubtedly require significant costs. Residents have been paying installments, but the funds collected are still insufficient.

D. Description of Research Downstream

We previously conducted a literature review on the role of families in medication adherence in pulmonary TB patients, which was published in the Sinta 3-accredited journal, the Unisma Islamic Health Journal, in 2024. The study found that the six journals we reviewed

demonstrated the role of families in medication adherence in pulmonary TB patients. Therefore, successful TB treatment requires support, including motivation, supervision, and family education for patients who are taking OAT regularly.

IMPLEMENTATION METHOD

We divide this Community Service Activity into several stages of activity. The first stage is the preparation stage. At this stage, the activity permit will be processed to the Head of RT, RW and Kelurahan, preparation of tools and materials such as banners/banners, materials and leaflets for counseling, physical examination tools/demonstrations for counseling if needed and transportation vehicles to reach the location.

The second stage is the activity, where the activity program offered is providing counseling to the community around the patient's location regarding healthy sanitation for TB infection prevention, sample for good environment, enough ventilation, cleaning activity of the environment, and good drainage for waste water disposal. To construct a drainage system for household waste disposal, we involved residents in constructing a drainage channel leading to a nearby river. This project lasted approximately three months, from May to July 2025.

The next stage is the final stage, namely evaluation. Indicators of the success of this community service activity include The community already has wastewater drainage channels so that there is no more stagnant wastewater and it causes air pollution (odor) that disturbs residents.

This Community Service activity not only involves lecturers, but also involves students with the aim of improving students' ability to socialize with the community.

RESULT AND DISCUSSION

Preparation stage

In the preparation stage, a communication and licensing process was carried out with the local RT Head, then a community discussion activity was held to plan the time and socialize what activities would be carried out related to this Community Service activity.

The community discussion activity was carried out in the yard of one of the residents' houses, attended by one of the Community Service team, a Lecturer, the RT Head and local community leaders and representatives of the residents. It was agreed that the residents accepted the activity and it would be begin in the second week of May 2025.



Figure 2. Atmosphere of community discussion

Implementation stage

Community service activities were carried out on Thursday, May 8, 2025, starting at 09.00 - 12.00. The activities carried out were counseling on TB (Definition, signs and symptoms, treatment, prevention), healthy sanitation for TB infection prevention, sample for good environment, enough ventilation, cleaning activity of the environment, and good drainage for waste water disposal. To construct a drainage system for household waste disposal, we involved residents in constructing a drainage channel leading to a nearby river. This project lasted approximately three months, from May to July 2025.



Figure 3. Opening



Figure 4. material Counseling



Figure 5. The Contruction of the drainage

Evaluation stage

The evaluation stage was carried out during the question and answer session, where the community was very enthusiastic about asking questions, this proved that the community understood what was explained during the counseling. Then after the construction of drainage was finish, now the community have drainage which drains household wastewater into the nearest river so that there is no more stagnant water that causes odors that disturb the environment.



Figure 6. Q&A atmosphere



Figure 7. Group photo after the event



Figure 8. Finishing the drainage

CONCLUSION

The role of lecturers can be said to support the community service if supported by institutions that hire them and involve them in community service activities. Basically this lecturer is not only related to teaching alone. Personality that build as a lecturer to fly in a career other than a lecturer is very awakened, his job as a lecturer is greatly cultivated by society.

Sometimes the public can appreciate his or her career outside the lecturer because he is a lecturer. (Montoya and Peter, 2002, Undang Undang Guru dan Dosen, 2005).



Figure 9. Group Photo of the Community Service Team

This community service activity, in addition to providing direct assistance in the form of basic necessities for families of TB patients, also provides knowledge to healthy residents so that they do not contract TB.

REFERENCES

- Kementerian Kesehatan Republik Indonesia. (2022). Profil Kesehatan Indonesia 2022. Kemenkes RI.
- World Health Organization. (2023). Global Tuberculosis Report 2023. WHO.
- Susilo, A., & Rahayu, T. (2021). Hubungan Faktor Lingkungan dengan Kejadian Tuberkulosis di Perkotaan. *Jurnal Kesehatan Masyarakat*, 17(2), 112-120.
- Cegielski, J. P., & McMurray, D. N. (2004). The relationship between malnutrition and tuberculosis: evidence from studies in humans and experimental animals. *International Journal of Tuberculosis and Lung Disease*, 8(3), 286-298.
- Courtwright, A., & Turner, A. N. (2010). Tuberculosis and stigmatization: pathways and interventions. *Public Health Reports*, 125, (Suppl 4), 34-42.
- Kemenkes RI. (2022). *Laporan Tahunan TBC Indonesia*. Kementerian Kesehatan Republik Indonesia.
- Lönnroth, K., Jaramillo, E., Williams, B. G., Dye, C., & Raviglione, M. (2010). Drivers of tuberculosis epidemics: the role of risk factors and social determinants. *Social Science & Medicine*, 68(12), 2240-2246.
- Migliori, G. B., Thongpmnu, C., Loddenkemper, R., & Centis, R. (2018). Extensively drug-resistant tuberculosis: back to the future. *European Respiratory Journal*, 52(3), 1801354.
- Yunus, F., Syahrudin, E., Nurwidya, F., & Ginanjar, E. (2021). Factors affecting tuberculosis treatment adherence in Indonesia: A systematic review. *Journal of Infection in Developing Countries*, 15(9), 1231–1239.
- Undang-Undang Republik Indonesia No 14 Tahun 2005 tentang Guru dan Dosen
- Montoya, Peter. 2002. *The Personal Branding Phenomenon*. Personal Branding Press. Graham Wilson, London.