

Climate Change, Migration, and Refugee as Triggers Risk of Leprosy Spread

Badrul Nurul Hisyam¹ and Tantut Susanto^{2,*}

¹*Program of Master of Nursing, Faculty of Nursing, Universitas Jember, Jember, Indonesia*

²*Department of Community, Family & Geriatric, Faculty of Nursing, Universitas Jember, Jember, Indonesia*

*corresponding: tantut_s.psik@unej.ac.id

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Introduction

One of the challenges in controlling leprosy is the displacement of people and refugees, which has the potential to accelerate the spread of the disease to areas that were previously free of it (Hooij & Geluk, 2021). Migration, especially that triggered by conflict, climate instability causing natural disasters, or economic pressures, often triggers mass displacement of people (World Health Organization, 2016). Refugees and migrants often must live in densely populated areas with poor sanitation conditions and very limited access to health services (Feizi et al., 2023). This situation creates an ideal environment for the spread of infectious diseases such as leprosy, where close and repeated interactions between sufferers and healthy individuals can increase the risk of transmission (Mahardita et al., 2019; Susanto, 2020). Overcrowding in refugee camps and limited health facilities make early detection and treatment of leprosy difficult, allowing the disease to spread undetected (Bulstra et al., 2021).

In migration situations, the spread of leprosy is often difficult to avoid, especially if migrants or refugees come from areas with high leprosy rates (Li et al., 2021). They have the potential to spread diseases to new communities (Ploemacher et al., 2020). This challenge is compounded by limited access to health services for both migrants and local residents. Areas without adequate health infrastructure to detect and treat leprosy are at risk of experiencing an increase in the number of cases, which can ultimately have a wider impact on society (Spekker et al., 2023).

Displacement due to conflict or natural disasters triggered by climate change not only results in loss of access to health services but also disrupts the continuity of treatment for people with leprosy who have been diagnosed with it (Murto et al., 2020). Leprosy treatment, which requires a long time and consistency, is often interrupted in emergency situations, making patients vulnerable to complications and disease transmission. Mass migration without adequate health planning can accelerate the spread of leprosy to previously unexposed populations, thus expanding its impact (Ploemacher et al., 2020). From an epidemiological perspective, migration and displacement serve as pathways for the spread of serious infectious disease. In addition to bringing the risk of transmission to new areas, migration conditions exacerbate social factors that affect access to treatment and health services (Susanto, 2018). The unpreparedness of migrant host communities to deal with diseases such as leprosy can result in the formation of new clusters of infection, ultimately slowing global efforts to eliminate the disease.

Migration and Refugee Triggers Risk of Leprosy Spread

The epidemiology of leprosy involves a comprehensive analysis of the factors that contribute to its spread (Bahtiar et al., 2020; Susanto et al., 2017), including migration and displacement due to disasters caused by unstable climate change, population density, sanitation conditions, and access to health services (Donoghue et al., 2020). Analytical epidemiological studies of leprosy include observing the patterns of incidence and prevalence of the disease in various regions, especially in areas with high population mobility (Rahmawati et al., 2023). Meanwhile, experimental studies have focused on testing specific interventions to control the spread of the disease, such as mass screening and treatment programs. Issues around migration and refugee-related climate change and how nurses handle them are described in Table 1.

Table 1. Issues around migration and refugee related climate change and how nurses handle

Aspect	Description	Impact and Solution
The Effect of Climate Change on the Development of Leprosy	Climate change is increasingly recognized as a factor that worsens the spread of infectious diseases, including leprosy. The impact of climate change on the development of leprosy can be explained through several mechanisms	<ol style="list-style-type: none"> 1) Increased population mobility due to Natural Disasters: Climate change increases the frequency of natural disasters, such as floods, droughts, and storms. These events force people to move to safer places, often to areas with limited or inadequate health facilities. Population mobility due to disasters, especially from areas where leprosy is endemic, can contribute to the spread of the disease. 2) Environmental changes that affect the spread of bacteria: Warmer temperatures and increased humidity can prolong the life of <i>Mycobacterium leprae</i> in the environment, especially in areas with poor sanitation. This increases the risk of transmission, especially in areas with dense populations and limited health infrastructure. 3) Increased vulnerability of populations to disease: Climate change can also worsen economic and social conditions, such as poverty and malnutrition, resulting in reduced immunity. Malnourished populations exposed to climate change stress become more susceptible to infections such as leprosy.
Issues of climate change impact on the spread of leprosy	Some of the main issues identified related to the impact of climate change on the development of leprosy	<ol style="list-style-type: none"> 1) Crowding and sanitation conditions in refugee camps: refugee camps built due to climate disasters are often crowded and lack adequate sanitation facilities. This situation facilitates the transmission of diseases that require close and prolonged contact, such as that of leprosy. 2) Limited access to health services: Natural disasters often damage health

Aspect	Description	Impact and Solution
Implications for nursing	To address the challenges posed by climate change and the spread of leprosy, a well-coordinated strategy covering prevention, early detection, and care is needed.	<p>infrastructure in affected areas, making access to leprosy diagnosis and treatment very difficult. This increases the risk of disease spread because many cases are undetected or untreated.</p> <p>3) Social stigma and socioeconomic barriers: In many communities, leprosy is still seen as a shameful disease. Migrants and refugees infected with leprosy often face discrimination and stigma, making them reluctant to seek medical help. This condition worsens the spread of the disease because many cases remain unreported.</p> <p>1) Improving Access to Health Services: Strengthening health facilities in refugee camps is essential. Mobile clinics can reach populations that are isolated or difficult to access because of natural disasters. In addition, the development of telemedicine can be an alternative to provide rapid and efficient access to care for refugees living in remote locations.</p> <p>2) Screening and Early Detection Programs: Implementing mass screening in refugee camps and disaster-affected areas is crucial for the early detection of leprosy cases. This can be done in conjunction with other infectious disease control programs, such as tuberculosis, to maximize resource utilization and increase the effectiveness of early detection.</p> <p>3) Education and Stigma Reduction: Comprehensive educational campaigns among migrants and refugees are essential to raise awareness about the symptoms of leprosy, the importance of early treatment, and to reduce the stigma associated with the disease. Training of local health workers is also essential for more effective detection and management of cases in vulnerable areas.</p>

Conclusion

Climate change poses new challenges to the spread of leprosy through increased migration, worsening environmental conditions, and higher socioeconomic vulnerability. To address this, a coordinated approach is needed, including improving access to health services, implementing early detection programs, and conducting educational campaigns to reduce stigma and raise awareness among vulnerable populations. With focused and sustained efforts, the impact of climate change on the

spread of infectious diseases, such as leprosy, can be minimized. Migration and displacement play significant roles in the spread of infectious diseases, such as leprosy, especially when affected populations live in crowded conditions with limited access to health services. This study provides a good analysis of the risks involved, but could be strengthened by further empirical studies and more targeted and realistic solutions. An approach that integrates more flexible health services, educational programs, and increased access to information and early screening may be more effective in reducing the spread of leprosy among migrants and refugees.

References

- Bahtiar, S., Susanto, T., & Rokhmah, D. (2020). People Affected by Leprosy Needs During Rehabilitation in Community Study of Health Care Provider Perceptions. *Nurseline Journal*, 5(2), 254–260. <https://doi.org/10.19184/nlj.v5i2.19653>
- Bulstra, C. A., Blok, D. J., Alam, K., Butlin, C. R., Roy, J. C., Bowers, B., Nicholls, P., de Vlas, S. J., & Richardus, J. H. (2021). Geospatial epidemiology of leprosy in northwest Bangladesh: a 20-year retrospective observational study. *Infectious Diseases of Poverty*, 10(1), 1–12. <https://doi.org/10.1186/s40249-021-00817-4>
- Donoghue, H. D., Michael Taylor, G., Marcsik, A., Molnár, E., Pálfi, G., Pap, I., Teschler-Nicola, M., Pinhasi, R., Erdal, Y. S., Velemínsky, P., Likovsky, J., Belcastro, M. G., Mariotti, V., Riga, A., Rubini, M., Zaió, P., Besra, G. S., Lee, O. Y. C., Wu, H. H. T., ... Spigelman, M. (2020). A migration-driven model for the historical spread of leprosy in medieval Eastern and Central Europe. *Infection, Genetics and Evolution*, 31, 250–256. <https://doi.org/10.1016/j.meegid.2015.02.001>
- Feizi, S., Awad, M., Nepal, R., Cooksley, C. M., Psaltis, A. J., Wormald, P. J., & Vreugde, S. (2023). Deferiprone-gallium-protoporphyrin (IX): A promising treatment modality against Mycobacterium abscessus. *Tuberculosis*, 142(July), 102390. <https://doi.org/10.1016/j.tube.2023.102390>
- Hooij, A., & Geluk, A. (2021). In search of biomarkers for leprosy by unraveling the host immune response to Mycobacterium leprae. *Immunological Reviews*, 301(1), 175–192. <https://doi.org/10.1111/imr.12966>
- Li, Y. Y., Shakya, S., Long, H., Shen, L. F., & Kuang, Y. Q. (2021). Factors Influencing Leprosy Incidence: A Comprehensive Analysis of Observations in Wenshan of China, Nepal, and Other Global Epidemic Areas. *Frontiers in Public Health*, 9(May), 1–11. <https://doi.org/10.3389/fpubh.2021.666307>
- Mahardita, N. G. P., Susanto, T., Siswoyo, Wuryaningsih, E. W., & Devianthony, F. (2019). Prevalence of disability and dropout from treatment: a cross-sectional study of social stigma and motivation for healing among people affected by leprosy in the District of Jember, East Java Province, Indonesia. *Indian Journal of Leprosy*, 91(4), 243–256.
- Murto, C., Chammartin, F., Schwarz, K., da Costa, L. M. M., Kaplan, C., & Heukelbach, J. (2020). Patterns of Migration and Risks Associated with Leprosy among Migrants in Maranhão, Brazil. *PLoS Neglected Tropical Diseases*, 7(9). <https://doi.org/10.1371/journal.pntd.0002422>
- Ploemacher, T., Faber, W. R., Menke, H., Rutten, V., & Pieters, T. (2020). Reservoirs and transmission routes of leprosy: A systematic review. *PLoS Neglected Tropical Diseases*, 14(4), 1–27. <https://doi.org/10.1371/journal.pntd.0008276>
- Rahmawati, H., Susanto, T., Kurdi, F., Deviantony, F., & Fauziah, W. (2023). The Correlation of Family Access to Clear Water with Diarrheal Disease Incidence in the Working Area of the Summersari Health Center, Jember Regency. *Avicenna Journal of Environmental Health Engineering*, 10(2), 103–109. <https://doi.org/10.34172/ajehe.5395>

- Spekker, O., Tihanyi, B., Kis, L., Madai, Á., Pálfi, G., Csuvár-Andrási, R., Wicker, E., Szalontai, C., Samu, L., Koncz, I., Marcsik, A., & Molnár, E. (2023). Leprosy: The age-old companion of humans – Re-evaluation and comparative analysis of Avar-period cases with Hansen’s disease from the Danube-Tisza Interfluve, Hungary. *Tuberculosis*, 142(February). <https://doi.org/10.1016/j.tube.2023.102393>
- Susanto, T. (2018). Public health nurse services for maternal-child immigrant healthcare: A literature review. *Central European Journal of Nursing and Midwifery*, 9(3), 873–879. <https://doi.org/10.15452/CEJNM.2018.09.0018>
- Susanto, T. (2020). Protecting the Rights of Leprosy Affected People in Rural Community of Jember, Indonesia. *Indian Journal of Leprosy*, 92(2), 115–118.
- Susanto, T., Dewi, E. I., & Iis, R. (2017). The Experiences of Person Affected by Leprosy Participated Self-Care Group in Community: A Qualitative Study. *Leprosy Review*, 88(4), 543–553. <https://doi.org/0305-7518/17/064053+11>
- World Health Organization. (2016). *Global leprosy strategy 2016–2020: Accelerating towards a leprosy-free world*. World Health Organization, Regional Office for South-East Asia.