



RELATIONSHIP BETWEEN EXPOSURE CONTACT HISTORY, PERSONAL HYGIENE, AND NEIGHBOR'S CONTACT HISTORY WITH LEPROSY

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ABSTRACT

Leprosy is a contagious infectious disease caused by the bacteria *Mycobacterium leprae*, which can cause tissue damage and potentially result in permanent damage to certain parts of the body. During the last five years (2020–2025) the incidence of leprosy was 12,12, 21,18,22, and 24 cases in Sukoharjo, the national target for leprosy eradication is less than one case per 10,000 people. The New Case Detection Rate (NCDR), the percentage of new cases in Sukoharjo Regency was 2.61% in 2025. The purpose of this study was to analyze the relationship between exposure contact history, personal hygiene, and contact history with neighbors to leprosy in Sukoharjo Regency. The research method used a quantitative approach with a case-control study. The study was conducted from December to March 2026 in several locations in Sukoharjo Regency. The sample consisted of 24 case respondents and 24 control respondents. The sampling technique used purposive sampling. Case respondents were all leprosy sufferers in Sukoharjo Regency in 2025 recorded at the Community Health Center. Control respondents were individuals who lived around the house of a leprosy sufferer for ≥ 2 years and were declared not to have leprosy by the Community Health Center. Data were collected through a structured questionnaire that included variables of contact history, personal hygiene, and contact history of neighbors. In addition, secondary data in the form of leprosy status and not leprosy were obtained from the Health Office and the Sukoharjo Regency Community Health Center. Sampling with a 1: 1 ratio. Bivariate data analysis used the chi-square test. The results of the statistical test showed a relationship between contact exposure (p-value 0.003, OR = 7.000), personal hygiene (p-value 0.020 OR = 4.048), while there was no relationship between contact with neighbors (p-value 0.247 OR = 1.970).

Keywords: contact exposure; leprosy; neighbor contact; personal hygiene

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INTRODUCTION

Leprosy is a disease caused by the bacterium *Mycobacterium leprae* that lasts for five to ten years. It primarily affects the skin and peripheral nerves, but can also affect the eyes and upper respiratory tract. The disease progresses slowly, so early signs are often not noticed by sufferers. Delays in treatment can result in nerve disorders that can lead to disability and impact social and economic life. The incubation period for leprosy is 5-10 years, this infection primarily attacks the skin and peripheral nerves (Ministry of Health of the Republic of Indonesia, 2020).

World Health Organization states that leprosy cases are still common in many countries. Currently, leprosy remains a health problem in many parts of the world. Indonesia is one of the countries with the highest number of cases compared to other countries, especially in eastern Indonesia. At the regional level, Central Java is also a province with a significant contribution of cases. Meanwhile, in Sukoharjo Regency itself, the number of cases in recent years has shown a fluctuating pattern from year to year (WHO, 2021). Data from the Ministry of Health as of 2026 shows that Indonesia is still dealing with around 16,000 new cases of leprosy, making it one of the countries with the highest burden of infectious diseases, especially in the Eastern Indonesia region which includes East Nusa Tenggara (NTT), Southeast Sulawesi, Central Sulawesi, South Sulawesi, Maluku, and parts of

East Java (Ministry of Health of the Republic of Indonesia, 2026). In 2025, Central Java will become the third largest province in Indonesia. The highest number of leprosy cases after West Java and East Java, with the highest number of leprosy cases after West Java and East Java. By the end of 2025, Central Java recorded more than 1,000 cases. (Detikhealth, 2025). Sukoharjo Regency is not included in the highest leprosy endemic areas in Central Java. Historical data for the period 2020 - 2025 showed fluctuating leprosy cases with consecutive numbers of leprosy incidents of 12, 12, 21, 18, 22, and 24 cases (Sukoharjo Health Office, 2024).

The Ministry of Health is committed to achieving the leprosy elimination target to achieve the goal of eliminating leprosy with a prevalence rate of <1 per 10,000 people and reducing the number of new cases (zero new cases) to achieve leprosy-free status by 2030 in Sukoharjo, the number of new cases is around 2.6%, and continues to be a health concern for the local population. Leprosy is classified as a tropical disease that still receives less attention, one of the reasons being the stigma in society. Many people still have a misconception about this disease, including how it is transmitted. Transmission generally occurs through prolonged close contact with sufferers who have not undergone treatment, for example through droplets when coughing or sneezing. However, the risk of transmission is actually not as high as is often feared. (Ministry of Health of the Republic of Indonesia, 2023).

New cases of leprosy are being found in adults, but the discovery of cases in children indicates that active transmission remains in the community. The WHO notes that delayed diagnosis remains a major problem, leading some patients to present with advanced disabilities due to nerve damage. The emergence of new cases of leprosy is closely linked to interactions with previous sufferers, especially in close environments such as family or neighbors. Continuous contact over a long period of time can open the door for the bacteria to enter the body. Furthermore, crowded environments and poor personal hygiene habits can also increase the risk of transmission in the community.

The annual detection of leprosy cases in Sukoharjo is influenced by the implementation of active case finding by community health center teams. New cases of multibacillary leprosy were found in 11 of the 12 community health centers in Sukoharjo Regency. Furthermore, in 2024, four leprosy patients with grade II disabilities were identified, demonstrating the importance of improving early detection, although no cases of leprosy in children have been found in Sukoharjo Regency (Sukoharjo Regency Health Office, 2024).

Leprosy types are divided into two main categories to facilitate treatment, namely Pausi Basiler (PB) and Multi-Bacillary (MB). Pausi Basiler (PB) / Dry leprosy is characterized by a low number of bacteria or even no bacteria being found on microscopic examination. It has a low risk of transmission (often called dry leprosy). Multi-Bacillary (MB) / This type of wet leprosy is characterized by a large number of germs and a high bacterial index. It is more contagious and causes more extensive nerve damage (often called wet leprosy) (WHO, 2026). Typical symptoms of dry leprosy (Pausi Basiler) include patches that can be lighter in color (white like tinea versicolor) or reddish, the amount of stool is generally less, the surface of the patch tends to be dry and stiff, numbness in the patch is very obvious, nerve damage only occurs in one nerve and nerve damage tends to be slower. Symptoms of wet leprosy (Multi-Bacillary) both have reddish white spots, but have more spots than the dry type, around 1-5 places, the spots tend to be thick, swollen and shiny, numbness in the skin is not as pronounced as in the dry type of leprosy, nerve damage is more than one peripheral nerve so that the damage is faster and more extensive, this results in a higher risk of physical disability (Ministry of Health of the Republic of Indonesia, 2022). In Sukoharjo Regency, when compared to 2023, leprosy cases in 2024 increased from 18 cases to 22 cases, all of which were wet leprosy or Multi-Bacillary. New cases of wet leprosy were discovered in ten of the 12 community health centers in Sukoharjo Regency.

Leprosy disability levels are classified into 0, 1, and 2 based on damage to the nerves, eyes, hands, and feet, with grade 2 disability indicating the most severe permanent disability. At Grade 0 Disability There are no abnormalities/defects in the eyes, hands, or feet. At this level, skin sensitivity is still normal. Next, Grade 1 Disability at this level there are nerve disorders (sensory/motor nerve damage) in the form of loss of touch (anesthesia) in the palms of the hands/feet, or muscle weakness without contractures, but no visible physical abnormalities are visible. Grade 2 Disability at this level is a clearly visible disability, such as paralysis, contractures (claw hand), chronic wounds on the soles of the feet, blindness (lagofthalmus), or shortening of the fingers/toes. In Sukoharjo Regency in 2024, four cases of leprosy with grade 2 disabilities were found. According to the results of observations conducted by the research team, cases of leprosy with grade 0 and grade 2 disabilities were found in the Mojolaban District. In leprosy patients with grade 0 disabilities, sensitivity was still normal in the hands and feet, but experienced numbness in the face. In leprosy patients with grade 2 disabilities, they experienced mutilation or loss of toes and muscle weakness in the fingers, resulting in bent fingers that could not be straightened (Claw hand) making it difficult for leprosy sufferers to carry out activities. Most leprosy cases in Indonesia are transmitted through close and prolonged contact with others, usually within the household. Poor health practices, including poor personal hygiene, can increase the risk of leprosy. Furthermore, these practices can lead to delays in detection and treatment, increasing the likelihood of disability and wider transmission (Mahendra et al., 2024). The level of leprosy disability can be caused by several main factors, namely the accuracy and speed of diagnosis, compliance of leprosy patients in taking medication, and the wet leprosy type/MB which has more bacteria than the dry leprosy type/PB. Disabilities can be divided into two, namely primary disabilities occur due to direct inflammation by the *Mycobacterium leprae* bacteria in the nerves. While secondary disabilities are a continuation of primary disabilities, such as infected wounds due to numbness. (Hansen, Type and Report, 2025)

The impact of disability due to leprosy can affect various aspects of life, including physical and health impacts, including numbness (Anesthesia), muscle weakness and paralysis (Motoric). Eye damage causes blindness, dry eyes, and the inability to close the eyelids completely. Chronic wounds (Ulcer) numbness combined with daily trauma causes open wounds, secondary infections, and even bone damage that leads to amputation. The social impact (stigma and isolation) of visible physical disabilities often triggers negative stigma from society, which considers leprosy a curse or a dirty disease. The economic impact is due to limited activity (Disability) leprosy sufferers experience limitations in carrying out daily activities and lose their jobs. Prevention of disability depends heavily on early detection and adherence to treatment (Multi-Drug Therapy) to stop the leprosy reaction that damages nerves (Unair.ac.id, 2022). Several studies have shown that the incidence of leprosy is influenced by various interrelated factors. Not only contact with sufferers, but also individual conditions such as personal hygiene and the immune system also play a role. Individuals who frequently interact with sufferers without adequate protection are at greater risk of infection, especially if they are in poor health (Rawanita et al., 2025).

The poor personal hygiene factor in the case group was higher than the control group, namely 83.3% and 43.3% respectively, a significance value of 0.026 which is below the 0.05 limit, so the relationship between personal hygiene and leprosy incidence in the Wonoasri Community Health Center area can be considered significant. In addition, the large odds ratio value shows that respondents with poor personal hygiene have a higher chance, which is around 4.375 times, of experiencing leprosy compared to respondents who maintain personal hygiene. Humans are the main reservoir of *Mycobacterium leprae*, Therefore, personal hygiene as part of a clean and healthy lifestyle has an important role in preventing leprosy transmission (Marsanti & Ardiani, 2020). Various research results have revealed the risk factors for leprosy, but so far in Sukoharjo Regency, there have been no research results that refer to the identification of risk factors causing leprosy from the history of exposure contact, personal hygiene and neighbor contact in detail. This study

was conducted with the aim of determining the relationship between the history of exposure contact, personal hygiene, and history of neighbor contact with leprosy in Sukoharjo Regency.

METHOD

This study is a quantitative study with a case-control design. The study period was December-March 2026, with the research locations in Bendosari, Bulu, Baki, Weru, Tawang Sari, Sukoharjo, Polokarto, Nguter, Grogol, Gatak, and Mojolaban Districts. In this study, the case group was taken from all leprosy sufferers recorded in Sukoharjo Regency in 2025. While the control group came from individuals who lived close to sufferers, but did not show any leprosy. The number of samples was 48 respondents consisting of 24 case respondents and 24 control respondents. The sampling technique used purposive sampling. The ratio of case and control samples was 1:1. This study was analyzed univariately and bivariately using chi-square. The instrument used was a questionnaire that had been tested for validity and reliability before the study was conducted in Surakarta City. Univariate analysis was used to describe the characteristics of respondents and research variables. The research variables consisted of independent variables, namely contact history of exposure, personal hygiene, and neighbor contact, while the dependent variable was the incidence of leprosy. Data were collected through a structured questionnaire to case respondents obtained from the Health Office and Community Health Centers of Sukoharjo Regency. Control data were obtained from the community health center, which stated that the control respondents did not have leprosy based on the results of the examination. Bivariate analysis was conducted to determine the relationship between each independent variable and the dependent variable using the test. Chi-square with a 95% confidence level ($\alpha = 0.05$). The results of the analysis are presented in the form of a contingency table with p-value, Odds Ratio (OR), and Confidence Interval (CI) 95%. The research has received ethical approval. Ethical Clearance" No. 353/EC/KEPK/I/2026 Surakarta National College of Health Sciences dated January 15, 2026.

RESULT

Respondent Characteristics

Table 1.

Frequency Distribution of Respondents by Gender

Gender	Case		Control		Total	
	f	%	f	%	f	%
Man	14	29,2	14	29,2	28	58,4
Woman	10	20,8	10	20,8	28	41,6

The distribution of respondents by gender is presented in Table 1. Respondents with leprosy cases were male, 14 (29.2%), while respondents with cases were female, 14 (29.2%). Control respondents were male, namely 10 (20.8%), the same as control respondents were female, totaling 10 (20.8%).

Table 2.

Frequency Distribution of Respondents by Age

Age	Case		Control		Total	
	f	%	f	%	f	%
<45 Years	7	14,6	4	8,3	11	22,9
>45 Years	17	35,4	20	41,7	37	77,1

The data in table 2 shows that 17 (35.4%) respondents in the case group were over 45 years old, 7 (14.6%) were under 45 years old, while 20 (41.7%) respondents in the control group were over 45 years old and 4 (8.3%) were under 45 years old.

Table 3.

Frequency Distribution of Respondents by Employment Status

Employment Status	Case		Control		Total	
	f	%	f	%	f	%
Work	9	18,8	10	20,8	19	39,6
Doesn't work	15	31,3	14	29,1	29	60,4

The distribution of respondents in the case group who were unemployed was 15 (31.3%), respondents with employed status in the case group were 9 (18.8%). In the distribution results of the

control group, those with unemployed status were 14 (29.1%) and respondents with employed status in the control group were 10 (20.8%).

Table 4.
Frequency Distribution of Respondents by Education Level

Level of education	Case		Control		Total	
	f	%	f	%	f	%
Base	21	43,8	15	31,2	36	75
Secondary	3	6,3	9	18,7	12	25

The education level in Table 4 shows that respondents in the case group with primary education level were 21 (43.8%), and those with secondary education level were only 3 (6.3%). Respondents in the control group with primary education level were 15 (31.2%), while in the control group respondents with secondary education level were only 9 (18.7%).

Table 5.
Bivariate Analysis of Leprosy

Bivariate Analysis of Leprosy									
Variable	Category	Leprosy incident				Amount		P value	OR 95% CI
		Case		Control		f	%		
		f	%	f	%				
Exposure Contact History	At risk	20	41,7	10	20,8	30	62,5	0,003	7,000 (1,822- 26,887)
	No risk	4	8,3	14	29,2	18	37.5		
Personal Hygeine	Bad	15	31,2	7	14,6	22	45.8	0,020	4,048 (1,210-13,538)
	Good	9	18.1	17	35,4	26	54,2		
Neighbor Contact	At risk	13	27,1	9	18.8	22	45.8	0,247	1,970 (0,622-6,235)
	No risk	11	22,9	15	31,3	26	54.2		

The results of the univariate analysis were used to describe the frequency distribution of each research variable. Based on Table 5, it is known that in the case group, the majority of respondents had a history of exposure contact that was included in the risk category, namely 41.7%. Conversely, in the control group, the majority of respondents were in the not-at-risk category, namely 29.2%. Respondents with poor personal hygiene in the case group were 31.2%. Meanwhile, in the control group, the majority were good at 35.4%. Case respondents in neighbor contacts were mostly at risk (27.1%). Meanwhile, in the control group, the majority were not at risk (31.3%). The results of the bivariate analysis showed that there was a relationship between exposure contact between exposure contact (p-value 0.003, OR=7.000), personal hygiene (p-value 0.020, OR= 4.048), and neighbor contact (p-value 0.247, OR=1.970) there was no relationship with leprosy in Sukoharjo.

DISCUSSION

The significance value obtained ($p = 0.003$) indicates that contact history is associated with leprosy incidence. The large odds ratio (7.000) illustrates an increased chance in the group that has been exposed compared to those who have not. This means that individuals who have had contact have a chance approximately 7 times higher. The results of other studies also show a similar trend. In the study obtained a p-value of 0.000 with an odds ratio of 6.270 (CI: 2.759–14.254), which means that respondents with a history of contact have a 6.27 times higher risk of developing leprosy compared to those who have not had a history of contact (Eso, 2022). The mechanism of leprosy transmission is not yet known for certain, the spread of bacteria is thought to occur through droplets when a sufferer coughs or sneezes. Transmission most often occurs through the respiratory tract, especially the nasal mucosa, but can also occur through broken skin. Living in the same house with a sufferer increases the chance of exposure several times compared to the general population. Family members who live together are advised to undergo regular check-ups as an early detection effort. Leprosy can be cured with antibiotics, and once treatment begins, the risk of transmission decreases drastically (Galuh Permatasari, 2022). Although leprosy is a contagious disease, it takes a long time for leprosy to infect a person, which is why leprosy is a neglected disease. A history of contact with leprosy sufferers can be addressed by screening at a community health center or hospital with a thorough physical examination. As an initial prevention measure, if there is a history of exposure to sufferers over a long period of time, chemoprophylaxis or prevention with drugs can be carried out. The incubation period is quite

long, averaging three to five years, leprosy screening should be carried out every six months to once a year (Rimbawati and Wulandari, 2025). Contact exposure to leprosy can be prevented independently by consuming nutritious food and maintaining the immune system to increase immunity. A good immune system can prevent leprosy bacteria from multiplying after entering the body.

Based on the analysis conducted, it shows that in the 24 respondents of the case group who had poor personal hygiene were 15 (31.2%) and those who had good personal hygiene were 9 (18.8%), while in the control group who had good personal hygiene were 17 (35.4%) and those who had poor personal hygiene were 7 (14.6%) with a p-value of 0.020 meaning there is a relationship between personal hygiene and leprosy in Sukoharjo Regency. The OR value = 4.048 means that people who have poor personal hygiene have a 4.048 times greater risk of contracting leprosy. A related study, conducted by Fadly Kaliky (2024), showed a significant relationship between bathing habits ($p = 0.004$), and the habit of borrowing towels ($p = 0.000$) and the incidence of leprosy. Improving personal hygiene is crucial in preventing leprosy because transmission is linked to contact with sufferers. Efforts that can be made include maintaining skin hygiene, washing hands and feet regularly, maintaining hair hygiene, maintaining clothing hygiene, and ensuring clean towels and bedding (Kalikyet al., 2024). In addition, the use of bath soap and towels together, the frequency of washing towels and changing bed sheets also includes a person's level of personal hygiene, the use of bath towels together (Liana Novita, 2023). In a study conducted by Ahmad Zaelain on the influence of personal hygiene on the occurrence of leprosy in the Sukatani Community Health Center work area, Purwakarta Regency, a p-value of 0.003 was found with an OR value of 4.295, which means there is a relationship between personal hygiene and the incidence of leprosy in the Sukatani Community Health Center work area (Zaelani, Sunita and Utami, 2021). Personal hygiene has an important role in preventing leprosy, in addition to washing hands and maintaining cleanliness, it is necessary to avoid using personal items together, using eating utensils, bathing utensils and beds with leprosy sufferers is very risky for transmission, it should be remembered that leprosy can be transmitted through droplets or splashes of saliva (Darmawan, 2020). Personal hygiene is part of self-care which plays a crucial role in preventing leprosy, as reported in various studies (Mujib Hannan, Cory Nelia Damayanti, 2025). The manifestations of leprosy are strongly influenced by the body's immune response, so early detection and prompt treatment are key to preventing disability and transmission. Poor personal hygiene can increase the risk of infectious diseases by increasing the opportunity for microorganisms to enter the body, thereby burdening the immune system (Albertoet al., 2022).

Based on the chi-square analysis, the p-value was 0.247, meaning there was no relationship between contact with neighbors and leprosy in Sukoharjo Regency in 2025. A qualitative study with a case study design conducted in Jayapura City from June to October 2021 revealed that screening activities carried out only on family members did not involve tracing the patient's contact history. Strengthening screening to detect new cases needs to be done by tracing contacts not only with family members but also with neighbors and contact history at school or workplace (Sahiddinet al., 2023). Research shows that contact within a household carries a higher risk than contact within a neighborhood. This is because leprosy transmission requires intense contact and a long duration of contact, so the influence of the neighborhood environment may be insignificant (Alecrin, Laura, and Oliveira, 2022). Household contact carries a higher risk than contact with neighbors. Contact with neighbors tends to have a lower duration and frequency, so that in some studies it does not show a significant relationship. WHO emphasizes that early prevention of leprosy transmission includes not only screening of household contacts but also the environment around the patient's residence, and a history of direct contact with long intensity (WHO, 2026).

CONCLUSION

Based on the results of the study, it can be concluded that male respondents in the case and control groups were 14 (29.2%), female respondents in the case and control groups were 10 (20.8%), respondents over 45 years old in the case group were 17 (35.4%) in the control group were 20 (41.7%), respondents in the case group who were not working were 15 (31.3%), the control group with unemployed status were 14 (29.1%), respondents in the case group with basic education level were 21 (43.8%), respondents in the control group with basic education level were 15 (31.2%). There was a relationship between exposure contact history (p-value 0.003, OR = 7,000), personal hygiene (p-value 0.020 OR = 4,048), while there was no relationship, namely neighbor contact (p-value 0.247 OR = 1,970) to leprosy in Sukoharjo Regency.

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