

Knowledge and Behavior as Factors in Preventing Leprosy Transmission at the Community Health Center

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ABSTRACT

Leprosy, or Morbus Hansen, is a chronic infectious disease caused by *Mycobacterium leprae* that primarily affects the skin and peripheral nerves. Limited knowledge and inappropriate preventive behavior may contribute to the continued transmission of leprosy. This study aimed to assess the knowledge and behavior of leprosy patients and analyze their association with the prevention of leprosy transmission. This analytic observational study used a cross-sectional design and was conducted in 2024 at Puskesmas Kalumata, Puskesmas Kota, and Puskesmas Siko. A total of 62 respondents were selected using accidental sampling. Data were analyzed using descriptive analysis, Fisher's exact test for bivariate analysis, and ordinal logistic regression for multivariate analysis. Most respondents were aged 20–60 years (77.4%), male (58.7%), had senior high school education (38.7%), were employed (72.6%), had low income (62.9%), and had easy access to health services (88.7%). Good knowledge about leprosy was found in 71.0% of respondents, while good preventive behavior was found in 45.2%. Bivariate analysis showed a significant association between knowledge and the prevention of leprosy transmission, whereas behavior was not significantly associated with prevention. Multivariate analysis showed that knowledge was the most influential factor in the prevention of leprosy transmission. In conclusion, knowledge was significantly associated with the prevention of leprosy transmission and was identified as the most influential factor. These findings highlight the importance of strengthening continuous health education to improve patients' understanding and support efforts to prevent leprosy transmission.

Keywords: behavior; knowledge; leprosy; transmission; health education

INTRODUCTION

Leprosy, or Morbus Hansen, is a chronic infectious dermatological condition caused by *Mycobacterium leprae*, a slow-growing acid-fast bacillus that primarily affects the skin, peripheral nerves, and, in advanced cases, the eyes and mucosal surfaces. Despite global progress in reducing its burden, leprosy remains a significant public health challenge due to its insidious onset, prolonged incubation period, and potential to cause irreversible disability when diagnosis and treatment are delayed. Clinical manifestations of leprosy often mimic other dermatological disorders, such as fungal infections, dermatitis, or neuropathic conditions, which contributes to underrecognition among affected individuals and within communities. This diagnostic ambiguity frequently results in delayed treatment initiation, thereby increasing the risk of nerve damage, deformities, and social stigma.

According to the World Health Organization (WHO), leprosy continues to be endemic in 120 countries, with approximately 200,000 new cases reported annually. Although global elimination efforts have reduced prevalence in many regions, several countries continue to experience persistent transmission. Indonesia ranks third worldwide in terms of leprosy burden, following India and Brazil, and contributes nearly 8% of global leprosy cases [1]. This persistent burden reflects ongoing challenges in early detection, surveillance, community awareness, and health system responsiveness.

National surveillance data from the Ministry of Health of the Republic of Indonesia indicate that the number of leprosy cases in 2022 reached 12,288, equivalent to 0.55 per 10,000 population. This figure represents an increase from the previous year, which recorded 0.5 per 10,000 population, suggesting that transmission remains active and that case detection efforts may still be insufficient. North Maluku Province reported a prevalence of 4.54 per 10,000 population, making it the second-highest province for leprosy cases after West Papua. Within North Maluku, Ternate City recorded the highest number of cases, with approximately 96 individuals diagnosed with leprosy [2]. These epidemiological patterns underscore the need for strengthened public health interventions, particularly in high-burden regions where environmental, socioeconomic, and cultural factors may contribute to sustained transmission.

Efforts to control leprosy aim not only to interrupt transmission chains but also to improve community health, reduce disability, and mitigate the profound social stigma associated with the disease [2]. Low levels of awareness among individuals, families, and communities often contribute to delayed treatment-seeking behavior, which in turn increases the likelihood of complications and long-term disability [3]. Knowledge is a critical determinant influencing perceptions, attitudes, and health-related behaviors, as cognitive factors play a central role in shaping preventive actions and decision-making processes [4]. Individuals with adequate knowledge of leprosy, its symptoms, transmission routes, and available treatments are more likely to adopt appropriate preventive measures, seek early diagnosis, and support affected community members [5]. Conversely, misconceptions and limited understanding may perpetuate stigma, hinder early detection, and reduce adherence to treatment.

Given these circumstances, a deeper understanding of factors associated with leprosy prevention, particularly community knowledge and behavioral practices is essential for designing effective public health strategies. Although studies on leprosy have been conducted in various regions of Indonesia, research specifically examining the relationship between knowledge, behavior, and preventive efforts against leprosy transmission in Ternate City remains limited. The unique epidemiological profile of Ternate, characterized by relatively high prevalence and persistent transmission, highlights the need for localized evidence to inform targeted interventions. Therefore, this study was conducted to analyze the relationship between knowledge and behavior in relation to leprosy transmission prevention efforts at Kalumata Health Center, Kota Health Center, and Siko Health Center in Ternate City, with the ultimate purpose of generating evidence that can strengthen community-based leprosy control initiatives.

METHODS

This study employed an analytical research approach using a correlational analytic method with a cross-sectional design. The cross-sectional framework was selected because it allows researchers to examine the relationship between variables at a single point in time, making it suitable

for assessing associations between knowledge, behavior, and leprosy prevention practices. The study was conducted at three primary health care facilities; Kalumata Health Center, Kota Health Center, and Siko Health Center in Ternate City throughout the year 2024. These health centers serve as referral points for leprosy case detection and management, making them strategic locations for capturing data from individuals diagnosed with leprosy.

The study population consisted of all patients diagnosed with leprosy who sought care at Kalumata, Kota, and Siko Health Centers during the 2024 period and met the predetermined inclusion and exclusion criteria. The inclusion criteria comprised patients with a confirmed diagnosis of leprosy, individuals capable of communicating effectively and comprehending written statements clearly, enabling them to respond accurately to questionnaire items, and patients who voluntarily agreed to participate by signing the informed consent form. The exclusion criteria included individuals who were not diagnosed with leprosy and patients who declined participation or refused data collection procedures.

The sampling technique used in this study was accidental sampling, a non-probability method in which participants are selected based on their availability and willingness to participate at the time of data collection. This approach was appropriate given the fluctuating number of leprosy patients visiting the health centers and the need to capture data from individuals who met the study criteria during the research period. Through this technique, a total of 62 eligible participants were successfully recruited as the study sample.

Primary data served as the main source of information for this study. Data were obtained through direct interviews with patients diagnosed with leprosy at the three participating health centers. The interviews were guided by a structured questionnaire developed by the researchers, consisting of systematically arranged items designed to assess knowledge, behavioral practices, and preventive efforts related to leprosy transmission. Prior to use, the questionnaire underwent validity and reliability testing to ensure that the instrument accurately measured the intended constructs and produced consistent results.

The data collection process involved face-to-face interactions between researchers and participants, allowing clarification of questions when necessary and ensuring that responses were recorded accurately. This method was particularly important given the varying levels of literacy and comprehension among patients, ensuring that all participants could engage meaningfully with the questionnaire content.

Data analysis procedures were conducted to manage, interpret, and draw conclusions from the collected information. All data obtained from interviews were entered and processed using the Statistical Package for the Social Sciences (SPSS). Descriptive analysis was performed to summarize participant characteristics, levels of knowledge, behavioral patterns, and preventive practices, with results presented in the form of frequency distributions, tables, and graphs.

To examine the relationship between knowledge, behavior, and leprosy transmission prevention efforts, the Fisher's Exact Test was employed. This statistical test was chosen because it is appropriate for analyzing associations between categorical variables, particularly when sample sizes are relatively small or when expected cell frequencies are below conventional thresholds. The analysis was conducted in accordance with the inclusion and exclusion criteria established by the researchers, ensuring that only eligible participants were included in the final dataset. The results of the analysis were subsequently interpreted to determine whether significant associations existed between the variables of interest.

RESULTS

Characteristics of respondents diagnosed with leprosy

Based on Table 1, the majority of respondents were aged 20–60 years (48 respondents) and predominantly male (37 respondents). Most respondents had completed senior high school (24 respondents), were employed (45 respondents), and reported low income levels (39 respondents). A large proportion of respondents had easy access to health services, with 55 individuals living within 1–15 minutes of a health facility.

Most respondents demonstrated good knowledge regarding leprosy (44 respondents), although preventive behavior was more frequently categorized as poor (34 respondents). Family support was predominantly positive, with 58 respondents reporting supportive family environments, and all respondents indicated that health workers played an active role in leprosy management.

A considerable proportion of respondents experienced drug side effects (58 respondents) and leprosy reactions (34 respondents). None of the respondents reported disability, and all confirmed that medications were consistently available at health facilities. The majority did not experience stress related to leprosy (53 respondents). Preventive practices against leprosy transmission were generally good, with 39 respondents falling into this category.

Table 1. Distribution of respondent characteristics

Variable	Frequency	Percentage
Age		
< 20 years	12	19.4
20–60 years	48	77.4
> 60 years	2	3.2
Sex		
Male	37	59.7
Female	25	40.3
Educational level		
No formal education	5	8.1
Elementary school	15	24.2
Junior high school	12	19.4
Senior high school	24	38.7
Higher education	6	9.7
Occupation		
Unemployed	17	27.4
Employed	45	72.6
Income Level		
Low	39	62.9
High	23	37.1
Access to health services		
Far (>15 minutes)	7	11.3
Near (1–15 minutes)	55	88.7
Knowledge level		
Adequate	18	29.0
Good	44	71.0
Behavior		
Poor	34	54.8
Good	28	45.2
Family support		
Not supportive	4	6.5
Supportive	58	93.5
Role of health workers		
Not involved	0	0
Involved	62	100
Drug side effects		
None	4	6.5
Present	58	93.5
Leprosy reaction		
None	28	45.2
Present	34	54.8
Disability		
None	62	100
Present	0	0
Drug availability		
Not available	0	0
Available	62	100
Stress		
No stress	53	85.5
Stress	9	14.5
Prevention practices		
Poor	23	37.1
Good	39	62.9

Association between knowledge and leprosy transmission prevention

Table 2 shows that among respondents with poor prevention practices, 18 had adequate knowledge and 5 had good knowledge. Conversely, among respondents with good prevention practices, 39 had good knowledge, and none had adequate knowledge. Fisher's Exact Test yielded a p-value <0.001 (<0.05), indicating a statistically significant association between knowledge and leprosy transmission prevention.

Association between behavior and leprosy transmission prevention

Table 3 indicates that among respondents with poor prevention practices, 12 demonstrated poor behavioral patterns, while 11 respondents in the same prevention category exhibited good behavior. Conversely, among respondents with good prevention practices, 22 showed poor behavior and 17 displayed good behavior, suggesting that both behavioral categories were distributed relatively evenly across prevention outcomes. The Fisher's Exact Test yielded a p-value of 0.796 (>0.05), indicating that the observed differences were not statistically significant. These findings imply that behavioral factors, as measured in this study, did not meaningfully influence leprosy transmission prevention practices, and that prevention outcomes may be shaped more strongly by other determinants such as knowledge, family support, or health system engagement.

Ordinal logistic regression analysis of influential variables

Based on Table 4, ordinal logistic regression analysis identified knowledge (X1) as the most influential variable affecting leprosy prevention. The Wald value of 21.409 and significance level of 0.000 indicate a strong and statistically significant effect. The parameter estimate of 21.409 further suggests that higher knowledge levels positively increase the likelihood of respondents engaging in effective leprosy prevention practices. In contrast, behavior (X2) did not demonstrate a significant effect on leprosy prevention, as indicated by a Wald value of 0.023 and a significance level of 0.879. These results imply that behavior, within the context of this study, does not significantly influence preventive actions against leprosy transmission.

DISCUSSION

The findings of this study indicate that the majority of respondents were within the age range of 20–60 years (77.4%). The predominance of this age group may be associated with higher levels of daily activity and mobility, which increase the likelihood of contact with diverse environments and potential sources of transmission. Furthermore, the long incubation period of leprosy often leads to delayed diagnosis, with the disease more commonly identified during adulthood [6,7]. This epidemiological pattern aligns with global observations that leprosy frequently manifests clinically after years of exposure, making adult populations particularly vulnerable.

In terms of sex distribution, most respondents were male (58.7%). This finding is consistent with studies by Amaliah et al. and Safira et al., which reported that leprosy prevalence tends to be higher among men than women [1,8]. Such differences may be attributed to gender-related variations in occupational roles, social interactions, and environmental exposure. In many settings, men engage more frequently in outdoor activities or occupations that increase mobility and contact with broader environments, thereby elevating the risk of exposure to infectious sources [8].

Most respondents had completed senior high school (38.7%), were employed (72.6%), and reported low income levels (62.9%). These characteristics are in line with previous studies indicating that leprosy is often found among individuals with moderate educational attainment and relatively low socioeconomic status [9–13]. Socioeconomic conditions can influence access to health information, nutritional adequacy, personal hygiene practices, and utilization of health services. Nevertheless, socioeconomic characteristics should be interpreted as contextual factors that shape general health conditions rather than direct determinants of leprosy prevention behaviors in this study.

A large proportion of respondents reported easy access to health services (88.7%), and all respondents confirmed that medications were consistently available at health facilities. These findings suggest that leprosy treatment services, including the provision of Multidrug Therapy (MDT), were functioning effectively in the study area. Convenient access to health facilities facilitates regular treatment adherence and enables patients to receive continuous education regarding disease management and transmission prevention [2]. The availability of MDT is particularly important, as uninterrupted therapy is essential for preventing complications and reducing transmission.

Regarding knowledge, most respondents demonstrated good understanding of leprosy transmission (71.0%). This result is consistent with studies by Sumantri as well as Liputo and Modjo, which found that respondents generally possessed good knowledge about leprosy [3,15]. Adequate knowledge enables individuals to comprehend transmission mechanisms, recognize the importance of treatment adherence, and adopt preventive measures. Knowledge therefore plays a central role in shaping appropriate health behaviors and strengthening individual capacity to prevent disease spread [16,18].

Despite the high level of knowledge, preventive behavior was predominantly categorized as poor (54.8%). This discrepancy suggests that good knowledge does not automatically translate into optimal preventive practices. Health behavior is influenced not only by knowledge but also by habits, attitudes, social norms, environmental conditions, and other enabling factors [19]. Consequently, improving knowledge must be accompanied by sustained education and supportive environments to ensure that preventive behaviors are consistently practiced in daily life.

Most respondents reported strong family support (93.5%), and all acknowledged the active role of health workers in leprosy treatment. Family support and health worker involvement are essential components that motivate patients to adhere to treatment schedules and enhance their understanding of disease management and prevention [15]. Additionally, a substantial proportion of respondents experienced MDT side effects (93.5%) and leprosy reactions (54.8%). These conditions may arise during treatment and require careful monitoring to prevent disruptions in

Table 2. Association between knowledge and leprosy transmission prevention

Knowledge	Leprosy transmission prevention		p-value
	Poor	Good	
Adequate	18	0	<0.001
Good	5	39	

Table 3. Association between behavior and leprosy transmission prevention

Behavior	Leprosy transmission prevention		p-value
	Poor	Good	
Poor	12	22	0.796
Good	11	17	

Table 4. Identification of the most influential variables

		Estimate	Std. Error	Wald	p-value
Threshold (prevention)		40,973	1,440	809,442	<0,001
Location	Knowledge	21,409	0,000	0,000	0,000
	Behavior	0,148	0,968	0.023	0,879

therapy adherence [2]. Notably, none of the respondents experienced disability, suggesting that early detection and appropriate treatment may have contributed to preventing disability associated with leprosy [2].

From a psychosocial perspective, most respondents did not experience stress related to leprosy (85.5%). This may be attributed to strong family and social support systems. Social support plays a crucial role in helping individuals cope with chronic illnesses and maintain quality of life [15].

Overall, most respondents demonstrated good leprosy prevention practices (62.9%). Although some respondents exhibited inadequate preventive behavior, the majority engaged in actions that support transmission prevention. These preventive efforts may be influenced by knowledge, behavior, family support, access to health services, and health worker education [3,5].

The Fisher's Exact Test analysis revealed a significant association between knowledge and leprosy transmission prevention. Respondents with higher levels of knowledge were more likely to engage in effective preventive practices. This finding aligns with studies by Sumantri and Koli et al., which also reported significant associations between knowledge and leprosy prevention behaviors [3,5]. Knowledge is a key determinant in shaping health behavior, as individuals who understand the causes, transmission routes, treatment, and prevention of leprosy are better equipped to identify risks and adopt appropriate preventive actions [18,19]. The ordinal logistic regression analysis further confirmed that knowledge was the most influential variable affecting prevention efforts. The positive direction of the relationship indicates that improvements in knowledge are accompanied by increased likelihood of engaging in preventive behaviors.

These findings underscore the importance of health education as a core component of leprosy control strategies. Educational interventions should not only provide information about treatment but also emphasize transmission mechanisms, the importance of regular therapy, recognition of signs and symptoms, and practical preventive measures that can be applied in daily life. Strengthening knowledge through continuous education delivered by health workers, families, and community networks can significantly enhance prevention efforts.

In contrast to knowledge, the analysis showed no significant association between behavior and leprosy transmission prevention. This finding differs from the results reported by Sumantri, who identified a significant relationship between behavior and prevention practices [3]. The absence of a significant association in this study suggests that the behaviors measured may not directly determine prevention outcomes. Health behavior is shaped by multiple factors, including knowledge, attitudes, habits, environmental influences, social support, and availability of resources [19]. Therefore, individuals may exhibit certain behaviors that are not consistently translated into preventive actions.

Differences from previous studies may be attributed to variations in respondent characteristics, environmental conditions, measurement instruments, or health service contexts. These findings highlight that improving leprosy prevention efforts requires more than behavioral modification; it also necessitates strengthening knowledge and enhancing support from families and health workers.

The results of this study reinforce the importance of improving knowledge as part of leprosy prevention strategies. Health education delivered appropriately and continuously can enhance knowledge, attitudes, and practices related to leprosy, including understanding symptoms, transmission routes, treatment adherence, and preventive actions. This aligns with findings from integrative reviews indicating that various health education methods can improve knowledge, attitudes, and practices related to leprosy prevention [20]. Continuous health education involving health workers, families, and community environments can therefore serve as a key approach to strengthening leprosy transmission prevention efforts.

This study has several limitations that should be considered when interpreting the findings. The use of accidental sampling at Siko and Kalumata Health Centers may limit the representativeness of the sample [21], as the respondents may not fully reflect all individuals with leprosy in Ternate City. Additionally, knowledge and behavior were measured using self-reported questionnaires, which may be subject to recall bias or social desirability bias. The cross-sectional design also limits causal inference, as the relationships identified cannot establish cause-and-effect pathways. Future research is encouraged to employ probability sampling techniques, include broader study areas, and consider additional factors that may influence leprosy prevention efforts.

CONCLUSION

The findings of this study demonstrate that knowledge is significantly associated with leprosy transmission prevention efforts and represents the most influential factor in determining preventive practices. In contrast, behavior did not show a statistically meaningful relationship with leprosy prevention, indicating that behavioral patterns measured in this study were not sufficient to predict preventive actions. These results highlight the central role of knowledge in shaping effective health practices and underscore the need for sustained health education and continuous leprosy-related health promotion initiatives. Strengthening educational interventions is essential for improving community understanding of leprosy and supporting more effective and consistent prevention efforts.

Ethical consideration, competing interest and source of funding

-This study obtained ethical approval and was conducted in accordance with established principles of research ethics. Prior to data collection, all respondents were provided with detailed informed consent, which included explanations regarding the study's purpose, procedures, potential benefits, and confidentiality safeguards. Participants were assured that their involvement was entirely voluntary and that they had the right to withdraw from the study at any time without experiencing any form of penalty or negative consequence.

-There are no conflicts of interest associated with the publication of this manuscript.

-The research was fully funded by the authors, with no financial support from external sponsors or institutions.

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