



Descriptive Investigation of a Newly Detected Leprosy Case in Nakhon Si Thammarat, Thailand, 2025

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Received: 9 Oct 2025; Revised: 9 Jan 2026; Accepted: 20 Feb 2026

<https://doi.org/10.59096/osir.v19i1.278202>

Abstract

Objectives: Newly detected leprosy cases can provide important insights into ongoing transmission and gaps in early diagnosis. In responding to the notification of a 59-year-old Thai female with grade 2 leprosy in Nakhon Si Thammarat Province, Thailand, an investigation was initiated to identify the epidemiological characteristics, assess factors related to the delay in diagnosis and treatment, and determine the source of the disease and whether screening was done among contacts.

Methods: A descriptive investigation was conducted using provincial reports, medical records, patient interviews, and active contact tracing.

Results: The case was diagnosed with multibacillary leprosy with an average bacterial Index of +5.3. Lesions were present on both sides of the body. The duration from onset to diagnosis was 18 years. A factor contributing to the long delay was misdiagnosis by physicians who were not dermatologists and were unaware of leprosy. Screening of 55 close contacts, including 5 household contacts, 47 neighbors, and 3 social contacts, revealed no clinical features consistent with leprosy.

Public Health Recommendations: All contacts will be followed for 10 years with annual screening. The patient's medication intake will be monitored and psychological support and social care has been arranged. Thasala hospital should strengthen their early case detection system by looking for cardinal signs of leprosy and by taking a history of risk factors for screening, diagnosis, and treatment.

Keywords: leprosy, newly detected, disability, descriptive investigation

Introduction

Leprosy is an infectious disease with a long incubation period. It is caused by the bacteria *Mycobacterium leprae*. It is transmitted through the respiratory system by prolonged and close contact with others with untreated multibacillary leprosy. The disease presents with polar clinical forms including multibacillary lepromatous leprosy and paucibacillary tuberculoid

leprosy, as well as other intermediate forms with hybrid characteristics. The incubation for paucibacillary leprosy is 3–5 years and for multibacillary leprosy 10–20 years. The disease manifests commonly through skin lesions and peripheral nerve involvement. Leprosy is diagnosed by identifying at least one of the following cardinal signs: (1) definite loss of sensation in a pale (hypopigmented) or reddish skin patch; (2) thickened or enlarged



peripheral nerve, with loss of sensation and/or weakness of the muscles supplied by that nerve; (3) microscopic detection of bacilli in a slit-skin smear.^{1,2} Delayed diagnosis remains an important epidemiological challenge. Early manifestations of the disease are often mild and nonspecific, leading to under recognition. Diagnostic delays increase the risk of irreversible nerve damage and physical disability.^{1,2,11,13} The World Health Organization (WHO) considers leprosy as a neglected disease and often receives a low policy priority by health ministries.² Although leprosy is curable, delayed or incomplete treatment may lead to irreversible disabilities. Cases may experience psychological distress about their physical condition, as well as being unable to work, leading to a lack of income to support themselves and their families. They also face discrimination from their family or the community, resulting in social problems.³ Thailand implemented multidrug therapy for leprosy in 1984, resulting in a rapid decrease in the prevalence. Consequently, the country has continuously achieved the WHO elimination target of fewer than one case per 10,000 population since 1994.⁴ Between 2019–2023, new case detection rates were 0.17, 0.13, 0.09, 0.11, and 0.10 per 100,000 population, respectively. Nevertheless, the percentage of new cases with Grade 2 disability gradually increased from 15.1% in 2019 to 28.0% in 2023, exceeding the International Federation of Anti-Leprosy Associations standard threshold of 10%.^{5,6}

Nakhon Si Thammarat Province is located in southern Thailand along the Gulf of Thailand and is one of the largest provinces in the region in terms of both population and geographic area. The province has historically been endemic for several neglected tropical diseases, including leprosy, making it a relevant setting for epidemiological studies on disease detection, surveillance, and health system. In Nakhon Si Thammarat Province, new leprosy cases were consistently detected every year with the rates of 0.07, 0.00, 0.07, 0.00, 0.14, and 0.07 per 100,000 population from 2019 to 2024.⁵

Raj Pracha Samasai Institute, a national referral center in Thailand specializing in the diagnosis, treatment, and control of leprosy, defines an area of leprosy for epidemiological indicators if the area meets any of the following criteria: (1) cases were reported for 10 consecutive years, (2) new cases in children under 15 years were detected within the past 10 years, or (3) seven or more new cases accumulated over the past 10 years.⁷ Areas that meet any of these criteria are designated as an epidemic area and are targeted for

specific control measures and active case finding. Reported leprosy cases have persisted for several years in certain districts of Nakhon Si Thammarat, particularly in Mueang District, thereby meeting the Raj Pracha Samasai Institute's criteria for classification as a leprosy-endemic area. No other district met any of these criteria.⁸

On 5 Feb 2025, a Joint Investigation Team (JIT) of the Office of Disease Prevention and Control 11 (ODPC11) was notified that the Nakhon Si Thammarat Provincial Health Office reported a confirmed new leprosy case in Tha Sala District. The case was diagnosed with multibacillary leprosy grade 2, displaying bilateral skin lesions. Since leprosy-related disability and its psychosocial impact pose significant challenges to public health, and social and rehabilitation services, detailed individual investigation to identify gaps in health service system and mitigate their effects are crucial particularly in endemic countries. The objectives of the investigation were to identify the epidemiological characteristics of this leprosy case, assess factors related to the delay in diagnosis and treatment, and determine the source of the disease and whether screening of contacts was done. The JIT conducted its investigations on 17 and 28 Feb 2025.

Methods

Descriptive Investigation

We present a case of multibacillary leprosy diagnosed using all three cardinal signs at Thasala Hospital in Thailand. A written informed consent for the publication was obtained from the case.

Descriptive epidemiology consisted of five actions: 1) a review of the leprosy situation where the study case lived, 2) case review, 3) source case investigation, 4) contact tracing, and 5) active case finding.

We reviewed reports from 2015 to 2024 to determine the annual number and classification of leprosy cases at Raj Pracha Samasai Institute (RPSI), Department of Disease Control. The RPSI database collects case reports from hospitals throughout the country.

The medical records of the study case were reviewed to obtain socio-demographic characteristics, clinical features, disability status, diagnosis, and treatment initiation.⁷ Laboratory results from Thasala Hospital and ODPC11 were obtained and reviewed. Additional, interviews were carried out with a total of 12 participants, including the study case, the mother of the study case, relatives, doctors, and nurses, to qualitatively assess treatment adherence and factors

associated with delayed presentation, as well as to gather information on stigmatization, based on the literature.⁹

The source case investigation involved interviews with the study case and her family by tracing the contact history in the past 20 years and focusing on whether family, neighbors, or individuals had chronic, untreated skin diseases, disabilities, or those who underwent long-term dermatological treatment.

Contact tracing was conducted as follows: contacts were screened for leprosy symptoms through interviews of the patient and relatives and this was verified by cross-checking the names on the list obtained from interviews with each patient and their relatives. Contacts were classified into three categories and registered accordingly and screened for leprosy using all three cardinal signs:^{1,2,7} (1) household contacts are individuals who live or lived in the same household with the study case for at least six months before initiation of treatment; (2) neighboring contacts are individuals who lived within a 20-meter radius of the study case's residence for at least six months before treatment began; (3) social contacts are individuals who socialized with the study case for at least three hours per day, three days a week, for at least six months before treatment.

An active case finding was conducted among close contacts and residents in the community. The medical records of Thasala Hospital were reviewed to extract clinical features and diagnoses, using the International Classification of Diseases, 10th Edition codes A30.0–A30.5, A30.8–A30.9, M79.2, L52, and B92 for the past 10 years (2014–2025). Laboratory records of slit skin smears from 2020–2025 were also reviewed. A confirmed case is any resident of Tha Sala District who either presented with microscopic detection of bacilli in a slit-skin smear between 2014–2025, or presented with at least two of the following three cardinal signs:⁷ (1) typical skin lesions; (2) definite loss of sensation in a pale (hypopigmented) or reddish skin patch; (3) thickened or enlarged peripheral nerve, with loss of sensation and/or weakness of the muscles supplied by that nerve.

Tools and Data Analysis

The national leprosy investigation form was used.⁷ A slit skin smear examination was conducted according to WHO guidelines at standard sites, including both earlobes and active skin lesions. After cleaning the skin, a small slit was made with a sterile scalpel, and dermal material was obtained by scraping the edges of the incision, then stained using an acid-fast staining

method. Slides were examined under oil immersion microscopy for *Mycobacterium leprae*, and results were reported using the bacteriological index.^{1,2} Descriptive statistics were used to summarize the findings and the qualitative data of interviews were analyzed by content analysis.

Results

Descriptive Findings

Leprosy situation in Nakhon Si Thammarat Province

New leprosy cases were detected and reported annually between 2014 and 2024. The numbers of new cases in these years were 4, 5, 1, 1, 1, 1, 0, 1, 0, 2, and 1, respectively, with corresponding prevalence rates of 0.26, 0.33, 0.07, 0.07, 0.07, 0.07, 0.00, 0.07, 0.00, 0.14, and 0.07 per 100,000 population. Overall, there were 16 cases (94.1%) classified as multibacillary, and one case (5.88%) as paucibacillary.

Case Review Results

Socio-demographic characteristics

The study case was a 59-year-old Thai female. Her occupation was housewife, she was Muslim, and had no underlying diseases. She lived in Tha Sala District, Nakhon Si Thammarat Province, for over 26 years. She did not travel abroad or relocate from another province.

Clinical features, disability status, diagnosis, and treatment

In November 2006, the study case received healthcare services at a primary hospital after feeling numbness at the tip of her fingers and toes. She denied contact with any chemicals. She was diagnosed with dermatitis and was treated with antihistamines. Between 2006–2025 the patient received healthcare services at a primary hospital for symptoms. Skin examination revealed asymmetrical, multiple, discrete, poorly defined borders and hyperpigmented plaques with decreased sensation on her back, nose, and both cheeks, loss of the outer two-thirds of both eyebrows, and infiltrated plaques on both earlobes, and nasal pain. In 2025, she underwent treatment at ODPC11 for raised red lesions, dry skin without itching or sweating, hair loss, and shiny and swollen skin. She had chronic wounds on her fingers and soles, numbness of lesions and extremities, and swelling in her palms, soles, knees, and elbows. Enlarged nerves and grade 2 disability were observed, including visible deformities on the hands and feet, clawed fingers, joint contractures, bone shortening, wounds, and mild visual impairment. She could count fingers at a distance of six meters (Table 1, Figure 1).

Table 1. Medical history of a new leprosy case in Tha Sala district, Nakhon Si Thammarat Province, 2006–2024.

Date	Symptoms and Laboratory findings	Diagnosis / treatment	Level of health care
November 2006	Numbness in soles and left big toe, intermittent	Contact dermatitis / antihistamines	Primary
February 2007	Same as previously	Contact dermatitis / antihistamines	Primary
July 2007	Same as previously	Contact dermatitis / antihistamines	Primary
April 2010	Foot muscle pain, ulcer under left foot	Contact dermatitis / antihistamines	Primary
August 2011	Red, dry raised patches on arms and legs	Contact dermatitis / antihistamines	Primary
March 2012	Left foot pain, swelling, tension	Contact dermatitis / anti-swelling medication	Primary
September 2012	Nasal cavity pain	Sinusitis / symptomatic treatment	Primary
December 2012	Left eye swelling	Contact dermatitis / anti-swelling medication	Primary
June 2013	Left facial swelling	Contact dermatitis / anti-swelling medication	Primary
February 2015	Nosebleed, foul-smelling nose	Sinusitis / symptomatic treatment	Primary
August 2017	Recurring lumps on limbs,	Contact dermatitis / antihistamines	Primary
August 2019	Non-itchy facial rash	Contact dermatitis / antihistamines	Primary
September 2020	Right eye pain, blurred vision	- / treated by ophthalmologist	Primary
December 2021	Numbness in hands and feet, swelling, toenail shedding	Contact dermatitis / anti-swelling medication	Primary
August 2023	Left foot pain, swelling, ulcer with discharge	- / hospitalized, symptomatic treatment	Primary
June 2024	Left shoulder pain, arm immobility, right hand swelling	- / antihistamines, anti-inflammatory, physical therapy	Primary
February 2025	Raised, red, dry, non-itchy lesions with no sweating, hair loss, shiny skin; chronic wounds on hands and feet; numbness, swelling, nerve thickening, visible deformities, clawed fingers, joint contractures, shortened bones, mild loss of vision, and slit skin smear was positive with an average Bacteriological Index of +5.3.	Multibacillary leprosy, grade 2 disability / treated with Rifampicin 600 mg, Clofazimine 300 mg monthly, Dapsone 100 mg daily, and Clofazimine 50 mg daily or 100 mg every other day for 24 months	Dermatology clinic, ODPC11, Department of Disease Control

ODPC11: Office of Disease Prevention and Control 11 Nakhon Si Thammarat.

**Figure 1. Pre-treatment, clinical presentation of patient A, Tha Sala District, Nakhon Si Thammarat Province, Thailand.**

Treatment adherence and self-stigmatization

The patient complied with treatment advice but demonstrated self-stigmatization. She believed that the disease was airborne or caused by allergic reactions to food. She concealed her diagnosis from others and avoided participating in social interaction and community events for fear that others might notice her symptoms.

Factors that lead to a delay in diagnosis

The patient experienced a delay of approximately 18 years from the onset of symptoms to diagnosis.

Results of source case investigation

The patient was an autochthonous case; she had never lived in an endemic area for more than six months. In addition, she had no history of international travel and had not relocated for the past 26 years.

Results of contact screening

We identified 55 contacts, including 5 household contacts, 47 neighbors living within a 20-meter radius of the patient, and 3 social contacts. All were followed up and screened negative for leprosy.

Results of active case finding

The active case finding in the community and medical record review in Thasala Hospital from 2014 to 2025 did not identify any further cases of leprosy.

Actions Taken

The JIT followed all contacts to screen for leprosy using all three cardinal signs. A follow-up list was created for annual check-ups within a 10-year surveillance. All contacts were registered in the leprosy surveillance system of the primary hospital. They subsequently underwent annual clinical examinations to detect signs and symptoms of leprosy, with particular attention to skin lesions, peripheral nerve involvement, and sensory impairment.

Active surveillance was conducted through scheduled follow-up visits or home visits by trained healthcare personnel. Health education was provided to contacts to improve awareness of early signs and symptoms of leprosy, emphasizing the importance of early detection, and treatment. Individuals with suspected leprosy were referred for confirmatory diagnosis and, if found positive, were promptly initiated on multidrug therapy in accordance with national guidelines.

Health education was also delivered to the patient for self-care, and to her contacts for recognizing early symptoms to timely seeking screening. ODPC11

physicians monitored the patient to prevent treatment complications and provided psychosocial support via referrals to social workers. Following completion of treatment, annual physical examinations were scheduled for three years. In addition, ODPC 11 and the Nakhon Si Thammarat Provincial Health Office conducted a training session for local medical staff on leprosy screening protocols.

Discussion

A 59-year-old Thai female was diagnosed with multibacillary leprosy. She lived in Tha Sala District, Nakhon Si Thammarat Province, an area without any defined epidemiological indicators where surveillance activities were scaled down to general measures and annual health education campaigns. This contrasts with target areas where new cases continue to be reported, necessitating rigorous contact tracing and intensified surveillance efforts.¹ Furthermore, the case presented with grade 2 disability, the highest grade for leprosy. Grade 2 is characterized by chronic inflammation and destruction of peripheral nerves. Delays in appropriate treatment led to permanent damage to key organs such as the eyes, hands, and feet, and consistent with existing literature.^{1,2,7} The occurrence of such disability was due to lack of a diagnosis and therefore absence of treatment, resulting in prolonged disease progression. Therefore, the most effective preventive strategy is early detection and treatment of new cases to prevent disease progression and nerve damage.¹⁰ Healthcare workers in primary health facilities should make efforts to screen and refer suspected cases as soon as patients meet the leprosy criteria to help reduce the degree of disability. Local health services must consistently be alert to patients presenting with hypopigmented or anesthetic patches, persistent skin lesions or nodules, or chronic dermatological symptoms unresponsive to certain treatment for over three months, alongside assessing exposure risk to commence rapid diagnosis and treatment.

The study case's symptoms presented in 2006 and a confirmed diagnosis of leprosy was not made until 2025. The delay from symptoms onset to diagnosis was 18 years, which was 19.9 times higher than the average duration for leprosy detection in Nakhon Si Thammarat province. This prolonged delay likely reflects the absence of a dermatologist at the primary hospital until 2025, when a specialist was finally appointed. This aligns with national findings in which 33% of new cases in 2023 were diagnosed within 12 months, which is under the national goal of $\geq 50\%$.⁶ In

2025, the national average delay between diagnosis and treatment was 69 months (range 1 month–23 years).⁵ A study in 2019 found that if the health care provider delay was more than one month, the odds of developing grade 1 or 2 disability were 1.4 times higher compared to a delay of less than one month.¹¹ When the patient had multi-bacillary type leprosy the odds of grade 1 or 2 disability at the time of diagnosis was nine times higher compared to pauci-bacillary type leprosy. These delays demonstrate the need to provide training for new physicians and primary hospital doctors, who are mostly general practitioners, on how to diagnose leprosy. Early case detection campaigns such as active surveys in areas should be done periodically as this can reduce delays and promote early diagnosis. Additionally, the program should lay greater emphasis on raising community awareness regarding the disease. Hence, periodic training of physicians would significantly contribute to reduced diagnostic delays and promote timely referral and early detection.

Although the study case accepted treatment, she exhibited self-stigmatization and misunderstood the disease's determinants, believing it was caused by airborne factors or associated with food allergies. More importantly, she concealed her illness and avoided participating in community events thereby increasing her social isolation. Additionally, she did not cooperate in informing healthcare workers of her exposure history, which could help identify the source of her infection. Nonetheless, interviews with her family strongly suggest that the case was locally infected as she did not live in endemic areas for more than six months or relocate to an endemic area in the past 26 years. Consequently, it is likely that she contacted with an undiagnosed case in the community. In the Chat Trakan and Wat Bot Districts, Phitsanulok Province, from 2010–2016, five confirmed cases were epidemiologically linked through close contact within family members.¹² This was in contrast with national data showing that 46% of new cases were household contacts.⁶ However, acquisition of the disease through contact with household members or others in the community could not be completely ruled out. Limitations in recall and the case's willingness to fully disclose her contact history to avoid social stigmatization likely played an important role.

Among the 55 contacts, none had clinical features consistent with leprosy. This complied with WHO's leprosy elimination framework and international literature on contact screening, which emphasizes active contact management as a key strategy to achieve zero transmission.^{2,6,8,12–15}

Limitations

Concerns about stigmatization among the patient and their relatives hindered cooperation during contact screening, leading to initial challenges in contact tracing by the investigation team. Nevertheless, after a second field visit, all identified contacts were successfully traced and followed up. As this study was retrospective, and leprosy is a long-term disease, recalling past exposure history may have affected our results.

Public Health Recommendations

The study recommendations that Thasala Hospital should incorporate leprosy into the differential diagnosis and remain alert to patients presenting with any of the following symptoms: chronic skin conditions lasting more than three months and unresponsive to treatment; anesthetic or discolored patches; raised shiny nodules; tender red nodules; swelling in the face, hand, or foot; palm or sole numbness; nerve tenderness; muscle weakness; and chronic foot ulcers. History taking should be strictly performed to initiate diagnosis and prevent disabilities and community transmission.

The Nakhon Si Thammarat Provincial Public Health Office should provide leprosy screening training for local medical staff at least once annually. In addition, RPSI should establish joint screening mechanisms for leprosy and leprosy-mimicking conditions (e.g., contact dermatitis, sinusitis) to improve early detection and reduce misdiagnosis.

Further studies should be conducted to assess the impact of stigmatization on patients with leprosy, determining the social, cultural, economic and occupational impacts, and to assess the health-seeking behavior of people with leprosy.

Conclusion

A woman with confirmed leprosy was detected in an area where there were no epidemiological leprosy indicators. The type of disease was multibacillary with bilateral lesions and grade 2 disability. She was likely infected in her community, and the delay from symptoms onset to diagnosis was 18 years. The delay might partly be due to a lack of familiarity with the diagnosis among the local physicians. Among 55 contacts, there were no clinical features consistent with leprosy. Contacts were registered for a 10-year surveillance schedule with annual check-ups. The patient's treatment is ongoing alongside psychosocial support and annual monitoring. Primary hospitals are strengthening early case detection with cardinal signs

by taking a history of risk factors for screening, early diagnosis, and treatment to prevent disability.

Acknowledgements

The authors are grateful to the individuals involved in the study and their relatives for their cooperation. We would like to express our deepest appreciation to the religious leaders for their valuable information throughout the interviews.

Authors Contributions

Kalita Wareewanit: Conceptualization, data curation, formal analysis, investigation, methodology, software, supervision, validation, visualization, writing—original draft, writing—review & editing.
Khumton Tanontip: Data curation, investigation.
Wichian Tragoolgit: Data curation, investigation.
Atchara Saebin: Data curation, investigation.
Kotrada Siriphol: Data curation, investigation.
Prapaipit Chaowalit: Data curation, investigation, project administration, resources.

Ethical Approval

This study was a part of routine investigation and response activities of the Department of Disease Control, Ministry of Public Health, Thailand. Therefore, ethical approval was not required.

Informed Consent

Informed consent was obtained from all participants involved in the study.

Data Availability

The datasets supporting this study are available from the corresponding author upon reasonable request (kugkig27@hotmail.com).

Conflicts of Interest

This authors declares no conflicts of interest.

Funding Support

There was no funding for this study.

Declaration of Generative-AI and AI-assisted Technologies in the Writing Process

No artificial intelligence (AI) tools were used to generate the content or findings of this evaluation. However, during the preparation of this manuscript, the author used AI-ChatGPT solely for grammar correction, and language refinement. All content was reviewed, edited and finalized by the author, who takes full responsibility for the final content.

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