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Clinical and Demographic Characteristics of Patients with Leprosy at Sanjiwani Regional General Hospital, Gianyar: A Five-Year Retrospective Study

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Abstract

Leprosy remains a public health concern in Indonesia; however, hospital-based data describing patients receiving care at regional facilities remain limited. This study aimed to describe the clinical and demographic characteristics of patients with leprosy receiving outpatient treatment at Sanjiwani Regional General Hospital, Gianyar, from 2021 to 2025. A descriptive observational study with a retrospective design was conducted using secondary data obtained from medical records. Total sampling was applied to all medical records that met the eligibility criteria; of the 37 identified patients, 35 were included in the analysis. The variables assessed included age group, sex, domicile, paucibacillary/multibacillary (PB/MB) classification, acid-fast bacilli (AFB) smear results, and leprosy reactions. Data were analyzed using univariate analysis and presented as frequencies and percentages. Most patients were aged 45–65 years (54.3%), male (65.7%), and resided in Gianyar Regency (85.7%). Multibacillary leprosy was identified in 30 patients (85.7%), AFB smear positivity was observed in 20 patients (57.1%), and leprosy reactions were documented in 19 patients (54.3%), comprising type 1 reactions in 11 patients (31.4%) and type 2 reactions in 8 patients (22.9%). These findings provide a hospital-based profile of patients with leprosy, characterized predominantly by adults, males, multibacillary disease, positive AFB smear results, and documented leprosy reactions. The results may serve as baseline information for service evaluation and further research while highlighting the need for early recognition of reactions and nerve function assessment to prevent disability.

INTRODUCTION

Globally, leprosy (Hansen disease) has not yet been fully eliminated. World Health Organization (WHO) data showed that 172,717 new cases were reported from 188 countries in 2024. Although 55 countries achieved zero reported cases, India, Brazil, and Indonesia together accounted for approximately 80% of global new cases, indicating that leprosy elimination remains a persistent challenge. The disease primarily affects the skin and peripheral nerves, and if left untreated, it can lead to progressive and permanent disability, accompanied by stigma

and social exclusion. Therefore, continuous monitoring and characterization of the clinical and epidemiological profiles of patients with leprosy are fundamentally important for evaluating the real-world effectiveness of elimination strategies (de Sousa Miranda et al., 2025; Guo et al., 2026; Mondal et al., 2025; Srihartati, 2025; G.-J. Yang et al., 2025).

The burden of leprosy in Indonesia is particularly prominent in the Southeast Asian region. In 2024, the country reported 14,698 new cases, continuing to rank among the top three countries globally in terms of new case numbers. At the provincial level in Bali, 90 new leprosy cases were reported in 2024, increasing from 86 cases in 2023. In the same year, the new case detection rate (NCDR) was 2.06 per 100,000 population, and the prevalence was 0.23 per 10,000 population, with 89 of the 90 new cases classified as multibacillary (MB). Gianyar Regency, as an administrative district within Bali Province, recorded an NCDR of 2.94 per 100,000 population in 2023, which was higher than the provincial average. These data indicate that although Indonesia has achieved the national-level "elimination" target, leprosy transmission persists in certain areas and populations, requiring more detailed surveillance data to guide local control efforts (Hasker et al., 2025; Prakoeswa et al., 2020; Sebong et al., 2025; Van Brakel et al., 2025; Yajima et al., 2023).

Existing studies on leprosy in Indonesia have provided a partial epidemiological overview; however, notable variations exist among studies. Samosir et al. reported a mean age of 46 years among 189 patients in Mojokerto, with 65.6% being male, 19% having grade 1 disability, and 29.6% having grade 2 disability. A study conducted on Sumba Island reported a median age of approximately 45 years and similarly demonstrated a predominance of multibacillary disease. Within Bali Province, a study at Bali Mandara Regional General Hospital during 2018–2020 showed that among 55 patients, 71% were male, the 25–44-year age group was the largest proportion (45.5%), and multibacillary disease accounted for 92.7% of cases. Collectively, these studies describe leprosy as predominantly affecting adult males and frequently presenting as multibacillary disease, although age distribution and disease classification proportions vary across regions (Arango-Úsuga et al., 2025; Cota Queiroz et al., 2024; Karunarathna et al., 2025; Silva et al., 2020; J. Yang et al., 2022).

Leprosy reactions are critical events in the clinical course of leprosy. These acute inflammatory episodes may occur before, during, or after treatment and are important risk factors for nerve damage and disability. Samosir et al. identified leprosy reactions as common risk factors for both grade 1 and grade 2 disabilities. A 2025 review by Mehta et al. indicated that early recognition of leprosy reactions is essential for limiting nerve damage and that high-resolution ultrasound shows potential for detecting mild nerve involvement. However, the proportion of leprosy reactions reported across studies varies considerably, ranging from 28.5% to 54.3%, and this variation may reflect differences in patient characteristics, study periods, and methods used for identifying and documenting reactions.

A clear evidence gap exists regarding leprosy characteristics in Gianyar Regency. Although provincial-level data from Bali Mandara Regional General Hospital and Prof. Dr. I.G.N.G. Ngoerah Hospital are available, studies specifically focusing on Sanjiwani Regional General Hospital in Gianyar Regency remain limited. The NCDR in Gianyar Regency in 2023 was higher than the provincial average, suggesting that underexplored transmission patterns may exist in this area. Moreover, existing studies in Bali have primarily focused on tertiary hospitals in urban centers such as Denpasar, whereas the patient population served by a district-level regional general hospital may have different sociodemographic and clinical characteristics. This difference has not been systematically assessed.

Describing the characteristics of patients with leprosy at the district hospital level has clear practical importance. The high incidence of leprosy reactions and their potential to impair nerve function require healthcare facilities to have adequate capacity for early recognition and timely

management. Samosir et al. emphasized the need to improve early case detection and disability prevention in the post-elimination era. If district-level healthcare facilities lack a systematic understanding of local leprosy characteristics, it becomes difficult to optimize screening strategies, reaction management, and referral pathways. Taal et al. further demonstrated that leprosy distribution in Indonesia is spatially heterogeneous and that hotspot analysis can identify high-risk clusters and optimize target populations for prophylactic interventions, highlighting the importance of district-level data collection.

The novelty of this study is reflected in several aspects. First, this study specifically focused on the characteristics of patients with leprosy at Sanjiwani Regional General Hospital in Gianyar Regency, addressing the limited availability of district-level healthcare facility data in Bali Province. Second, by covering a five-year period from 2021 to 2025, the study reflected recent epidemiological characteristics of leprosy, including the period following the COVID-19 pandemic. Third, the study incorporated multiple variables, including age, sex, domicile, PB/MB classification, AFB smear results, and leprosy reaction types, providing a comprehensive patient profile compared with studies using single indicators. Finally, by comparing district hospital data with provincial and national data, the study contributed to understanding leprosy distribution across different levels of the healthcare system.

This study aimed to describe the clinical and demographic characteristics of patients with leprosy receiving outpatient treatment at Sanjiwani Regional General Hospital, Gianyar, from January 1, 2021, to December 31, 2025. The study specifically assessed age group, sex, area of domicile, PB/MB classification, AFB smear results, and the occurrence of leprosy reactions. By systematically collecting and analyzing these variables, the study sought to establish a baseline profile of patients with leprosy at this hospital, providing data to support evaluation of diagnostic and treatment services and optimization of patient management.

The contribution of this study lies in providing localized epidemiological baseline data on leprosy at a district-level healthcare facility. These data can be used to evaluate whether the hospital effectively reaches high-risk populations, identify potential issues such as diagnostic delays or inadequate management of leprosy reactions, and establish a reference point for evaluating future interventions. From a broader perspective, the findings can be compared with data from other hospitals in Bali Province to improve understanding of variations in leprosy distribution across different service levels and geographic areas and to support adjustments in regional leprosy control strategies.

The expected beneficiaries of this study include multiple stakeholders. For clinicians at Sanjiwani Regional General Hospital, the findings can enhance awareness of local patient characteristics and promote more timely diagnosis and recognition of leprosy reactions. For the Gianyar Regency health authority, the data can support evidence-based resource allocation and service planning. For the broader field of leprosy research, this study provides district-level epidemiological data from post-elimination Bali, contributing to and complementing existing knowledge. Ultimately, by improving understanding of patient characteristics, this study is expected to support early case detection and disability prevention, contributing to the global goal of “zero leprosy.”

METHOD

This study employed a descriptive observational design with a retrospective approach using secondary data obtained from medical records. The research was conducted at Sanjiwani Regional General Hospital, Gianyar, Bali, Indonesia, covering the period from January 1, 2021, to December 31, 2025. Data collection and processing were performed in 2026. The accessible population included all patients with leprosy who received care at Sanjiwani Regional General Hospital during the study period. Patients were included if they had a confirmed diagnosis of

leprosy, received treatment during the study period, and had medical records containing the required study variables. Records with incomplete information were excluded. Of the 37 patients identified during the initial review, 35 met the eligibility criteria and were included in the final analysis.

Total sampling was applied, including all eligible medical records as the study sample. Data were collected using a structured extraction sheet developed by the researchers to obtain relevant variables from medical records. The variables assessed included age group (15–24, 25–44, 45–65, and >65 years), sex, domicile, leprosy classification as paucibacillary (PB) or multibacillary (MB), acid-fast bacilli (AFB) smear results (positive or negative), and leprosy reactions categorized as no reaction, type 1 reaction, or type 2 reaction/erythema nodosum leprosum (ENL). Data accuracy was ensured through review by the research team and cross-checking with the original medical records. Repeated visits with the same medical record number were considered as a single patient to prevent data duplication.

Data collection was conducted through the review and extraction of information from medical records according to the predefined variables. The collected data were recorded, cleaned, and organized into a structured database. Data analysis was performed using univariate analysis to describe the distribution of each variable. Data processing was conducted using statistical software. The results were presented as frequencies (n) and percentages (%), with tables illustrating the distribution of patients with leprosy according to age, sex, domicile, leprosy classification, AFB smear results, and leprosy reaction types. No inferential statistical tests were performed because the study was descriptive and aimed to characterize the patient population rather than evaluate associations or causal relationships among variables.

RESULTS AND DISCUSSION

During 2021–2025, this study characterized patients with leprosy receiving care at Sanjiwani Regional General Hospital, Gianyar, according to age, sex, area of domicile, operational classification, AFB smear results, and occurrence of leprosy reactions.

Table 1. Distribution of Patients with Leprosy by Age

Age Group	N	%
15–24 years	4	11,4
25–44 years	8	22,9
45–65 years	19	54,3
>65 years	4	11,4
Total	35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, during the 2021–2025 period, processed by the researchers (2026).

Most patients with leprosy (54.3%) were aged 45–65 years (Table 1). This finding is consistent with studies showing that leprosy is frequently identified among adults.[7–9] Indonesian data show a similar pattern, although age-group definitions vary across studies. Samosir et al. reported a mean age of 46 years among 189 patients in Mojokerto, whereas a study on Sumba Island reported a median age of approximately 45 years.[8,9] In contrast, patients aged 25–44 years constituted the largest group at Bali Mandara Regional General Hospital.[4] Differences in age distribution across studies may reflect variations in population characteristics and patterns of healthcare utilization at individual facilities. In addition, the prolonged course and long incubation period of leprosy mean that age at diagnosis does not necessarily reflect the age at which infection was first acquired.

Table 2. Distribution of Patients with Leprosy by Sex

Sex	N	%
Male	23	65,7
Female	12	34,3
Total	35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, for the 2021–2025 period, processed by the researchers (2026).

The proportion of male patients was 65.7% (Table 2), consistent with trends reported across different populations. A meta-analysis by Yang et al. estimated a pooled male proportion of 63%, while studies in Mojokerto and at Bali Mandara Regional General Hospital reported 65.6% and 71%, respectively.[4,7,8] In northeastern Brazil, male sex was also reported more frequently among patients with MB disease.

Table 3. Distribution of Patients with Leprosy by Area of Domicile

District	Regency	N	%
Sukawati	Gianyar	8	22,9
Tampaksiring	Gianyar	7	20,0
Gianyar	Gianyar	7	20,0
Blahbatuh	Gianyar	4	11,4
Ubud	Gianyar	3	8,6
Payangan	Gianyar	1	2,9
Kintamani	Bangli	1	2,9
Susut	Bangli	1	2,9
Tejakula	Buleleng	1	2,9
Nusa Penida	Klungkung	1	2,9
Abang	Karangasem	1	2,9
Total		35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, for the 2021–2025 period, processed by the researchers (2026).

Based on area of domicile (Table 3), most patients resided in Gianyar Regency (85.7%). The largest proportion came from Sukawati District (22.9%), followed by Tampaksiring and Gianyar districts (20.0% each). These findings describe the geographic distribution of patients with leprosy receiving care at Sanjiwani Regional General Hospital. However, domicile distribution in this study cannot be interpreted as reflecting transmission patterns or community case clustering because no spatial analysis was performed. Mapping residential locations together with spatial analysis can help identify case clusters and define target areas for leprosy interventions.

Table 4. Distribution of Patients with Leprosy by Leprosy Classification

Leprosy Classification	N	%
Multibacillary (MB)	30	85,7
Paucibacillary (PB)	5	14,3
Total	35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, for the 2021–2025 period, processed by the researchers (2026).

In this study, 85.7% of patients were classified as MB (Table 4). This proportion was close to that reported at Bali Mandara Regional General Hospital (92.7%), while the Sumba study likewise showed a predominance of MB disease; globally, the meta-analysis by Yang et al. estimated a pooled MB proportion of 69%.[4,7,9] These findings represent patients receiving care at Sanjiwani Regional General Hospital and therefore should not be generalized to all individuals with leprosy in Gianyar.

Table 5. Distribution of Patients with Leprosy by AFB Smear Result

AFB Smear Result	N	%
Positive	20	57,1
Negative	15	42,9
Total	35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, for the 2021–2025 period, processed by the researchers (2026).

Positive AFB smears were recorded in 57.1% of patients (Table 5), whereas 85.7% were classified as MB. This difference is expected because AFB smear results are not the sole basis for the operational classification of leprosy; the number of skin lesions and nerve involvement are also used to determine PB or MB classification. The bacteriological data available in this study were limited to positive or negative AFB smear results; therefore, the bacterial index (BI) could not be analyzed further.

Table 6. Distribution of Patients with Leprosy by Leprosy Reaction

Leprosy Reaction	N	%
No reaction	16	45,7
Type 1 reaction	11	31,4
Type 2 reaction	8	22,9
Total	35	100

Source: Secondary data from medical records of patients with leprosy at Sanjiwani Regional General Hospital, Gianyar, for the 2021–2025 period, processed by the researchers (2026).

One notable finding was that leprosy reactions were documented in 54.3% of patients. This proportion was similar to that reported in the 10-year retrospective cohort by Antunes et al., in which 201 of 390 patients (51.5%) experienced leprosy reactions.[13] Studies conducted in Bali, however, have reported varying proportions. At Prof. Dr. I.G.N.G. Ngoerah General Hospital, Denpasar, 74 of 260 patients (28.5%) treated during 2021–2023 had leprosy reactions, with ENL accounting for the largest proportion of reactions (55.4%).[14] Meanwhile, the 2018–2020 study at Bali Mandara Regional General Hospital reported ENL in 8 of 55 patients (14.5%) and identified no type 1 reactions.[4] Differences among studies should be interpreted in light of variations in patient characteristics, study periods, and methods used to identify and document leprosy reactions.

In this study, type 1 reactions were identified in 11 patients (31.4%), whereas type 2 reactions/erythema nodosum leprosum (ENL) were identified in 8 patients (22.9%) (Table 6). Type 1 reactions are associated with an enhanced cell-mediated immune response to Mycobacterium leprae antigens and occur predominantly within the borderline spectrum, whereas ENL is a systemic inflammatory reaction that occurs mainly in multibacillary leprosy, particularly in borderline lepromatous and lepromatous disease. Both reaction types may involve peripheral nerves and cause nerve function impairment; early recognition and treatment are therefore important for preventing disability.

Clinically, prompt recognition of leprosy reactions is important because acute inflammation may be accompanied by neuritis and sensory or motor impairment, which can contribute to disability. Early recognition of reactions and assessment of nerve function are therefore essential components of disability prevention.

Study Limitations

This study has several limitations. Because of its retrospective design, data quality depended on the completeness and accuracy of medical record documentation. The study was conducted at a single hospital and included only 35 patients; consequently, the findings cannot be directly generalized to all patients with leprosy in Gianyar or Bali. Bacterial index values were not consistently available in the medical records and could not be analyzed further. Domicile data describe only the administrative distribution of patients and were not

accompanied by spatial analysis. In addition, the descriptive nature of the analysis precluded assessment of statistical associations or causal relationships among the variables examined.

CONCLUSION

Among patients with leprosy treated at Sanjiwani Regional General Hospital, Gianyar, during the 2021–2025 period, the majority were aged 45–65 years (54.3%), male (65.7%), and resided in Gianyar Regency (85.7%), particularly in Sukawati, Tampaksiring, and Gianyar districts. Multibacillary (MB) leprosy predominated, accounting for 85.7% of cases, while positive acid-fast bacilli (AFB) smear results were documented in 57.1% of patients. Leprosy reactions were identified in more than half of the patients (54.3%), with type 1 reactions (31.4%) occurring more frequently than type 2 reactions/erythema nodosum leprosum (ENL) (22.9%). These findings indicated that patients receiving care at this hospital were predominantly adults with multibacillary disease and a high burden of leprosy reactions, underscoring the importance of early recognition of reactions and nerve function assessment in this setting. Collectively, these results provided a hospital-based clinical and demographic profile that may serve as baseline data for service evaluation, resource planning, and future research in Gianyar Regency.

Future research should address the limitations identified in this study. A multicenter design involving other hospitals in Bali Province, including tertiary referral centers, would enable broader comparisons and improve the generalizability of findings beyond a single district hospital. Prospective studies with systematic documentation of the bacterial index (BI), nerve function impairment, and disability grading are needed to better characterize disease severity and treatment outcomes. Spatial analysis using geographic information systems (GIS) should be incorporated to identify case clustering and high-risk areas, thereby supporting targeted leprosy interventions in Gianyar and surrounding regencies. Additionally, analytical studies examining risk factors associated with multibacillary disease and leprosy reactions, including immunological and sociodemographic determinants, would provide deeper insights into the factors influencing disease presentation and inform more effective prevention and management strategies. Finally, strengthening the completeness and standardization of medical record documentation at the facility level is essential to support higher-quality retrospective research in the future.

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