Original Article

# Incidence and Clinical Patterns of Leprosy in Interior Sindh; Retrospective Study

Clinical Patterns of Leprosy in Interior Sindh

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## ABSTRACT

**Objective:** Incidence and Clinical Patterns of Leprosy in Interior Sindh: A Four-Year Retrospective Analysis.
**Study Design:** A case-control retrospective study
**Place and Duration of Study:** This study examines newly diagnosed leprosy cases in interior Sindh and was conducted at the Pathology Department CMC (SMBBMU), Larkana from August 2023 to July 2024.
**Methods:** The study comprised newly diagnosed leprosy patients from 17 designated locations. Cases were people who were diagnosed with leprosy based on clinical signs and laboratory results. All cases' demographic information, such as age, gender, regional distribution, and clinical trends, were obtained. All data was analysed using the SPSS 26 version software.
**Results:** A total of 239 new leprosy cases were registered across all leprosy centers in interior Sindh between 2019 and 2022. Male patients accounted for 154 cases (64.43%), outnumbering female patients, who comprised 85 cases (35.56%). The mean age of the patients was 42.44 ± 10.22 years, ranging from 3 to 59 years. Notably, the 15–30-year-old age group was the most affected. During the four-year study period, the most common forms of leprosy observed were borderline tuberculoid (BT) in 92 cases (38.49%), tuberculoid tuberculoid (TT) in 72 cases (30.12%), borderline lepromatous (BL) in 48 cases (20.08%), borderline borderline (BB) in 16 cases (6.69%), and lepromatous lepromatous (LL) in 11 cases (4.6%). Additionally, multibacillary (MB) cases were more prevalent, with 172 cases (71.96%), while paucibacillary (PB) cases accounted for 67 cases (28.03%).
**Conclusion:** To eliminate the stigma associated with the illness by educating the public about the fact that it is a bacterial disease that is readily curable.
**Key Words:** Incidence, Clinical, Leprosy centers.

**Citation of article: Jaikishan, Gemnani VK, Abro K, Parkash O, Naz L, Kumar A. Incidence and Clinical Patterns of Leprosy in Interior Sindh; Retrospective Study. Med Forum 2025;36(1):41-46. doi:10.60110/medforum.360109.**

## INTRODUCTION

Leprosy is a chronic infectious illness caused by Mycobacterium leprae or lepromatosis that spreads by aerosols from the nose and mouth after close and regular contact with untreated individuals. Stigmatisation and prejudice disrupt people's life, therefore early detection is critical for disease management. [1]

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Received: August, 2024
Reviewed: September-October, 2024
Accepted: November, 2024

Because of the sluggish development of the Mycobacterium leprae germs, leprosy symptoms might show up to 20 years after infection, making early detection and treatment difficult. [2]

Despite the availability of curative therapy, leprosy remains a global problem, with no change in yearly incidence over the last decade. The WHO South East Asia area is the most severely hit, accounting for more than 70% of new cases. Noncompliance with multi-drug therapy is one reason why leprosy continues to spread. [3]

Leprosy is frequently associated with socioeconomic determinants of health, and despite effective therapy, over 200,000 new cases were reported worldwide in 2019. Early identification is critical for efficient leprosy control because it limits the spread of infection and prevents impairments. [1]

In 2004, 407,791 new cases were found, according to a WHO report. Leprosy had been eradicated as a public health concern around the world in 2000. When leprosy was first discovered in India in December 2005, at a prevalence rate of less than 1 per 10,000, the WHO indicated that the prevalence was 181941 at the start of 2012. [4]

In 2023, 184 nations, regions, and territories contributed leprosy data, resulting in 182,815 new cases, with 72,845 (39.8%) females and 10,322 (5.6%) children. Despite curative treatment being available, leprosy is still prevalent worldwide, with little change in annual cases observed in the past decade. The WHO South East Asia region is the worst affected, accounting for over 70% of new cases. One reason leprosy transmission still occurs is non-adherence to multi-drug therapy.

This suggests that nations in the African (AFR) and Southeast Asian (SEAR) regions have the highest rates of detecting new cases. India, Brazil, and Indonesia continued to report the most new cases (>10,000) out of the 127 countries that submitted data in 2020; out of the 124 countries that provided data on child cases, SEAR reported 62% of all new child cases.[5]

The decrease in the number of new cases has occurred gradually. According to statistics from 2023, Brazil, India, and Indonesia continue to record more than 10,000 new cases, while 12 other countries, including Bangladesh, Myanmar, Nepal, Nigeria, the Philippines, Somalia, and Sri Lanka, report 1,000-10,000 new cases. Fifty-six nations reported zero instances, while 112 reported less than 1000 new cases.[6]

Recent developments have drawn attention to IRIS (Immune Reconstitution Inflammatory Syndrome in HIV-positive) or leprosy reversal patients. IRIS frequently happens after beginning highly active antiretroviral treatment (HAART).[7]

Some armadillos in the southern United States are naturally infected with the bacterium that causes Hansen's disease in humans, but the risk is very low, and the majority of individuals who come into contact with armadillos are at little risk of leprosy.[8] Man-to-man transmission of M. leprae predominates because patient diagnosis and treatment are crucial to halting the chain of transmission.[9]

The WHO system has taken the position of the Ridley and Jobling scale, which categorizes illnesses as either paucibacillary or multi.[10] The disease's patterns range from tuberculoid (paucibacillary), which has few skin lesions and a noticeable cell-mediated response, to lepromatous (multibacillary), which has many weak cell-mediated immunities against M. leprae.

Operational definition of selected leprosy patients: the diagnosis was based upon two factors,

Any two signs of leprosy

Localized skin lesions

Raised or flat Light or pigmented.

Sensory loss in the lesion

Thickened peripheral nerves

Laboratory test

Laboratory acid-fast test positivity in a slit skin smear or biopsy (histopathological) report according to WHO criteria

Leprosy is a significant health problem in developing countries such as Sindh, Pakistan. It can lead to serious disabilities if not treated properly. Understanding leprosy incidence in Sindh is crucial for identifying high-risk areas, improving detection, and developing better intervention strategies. Understanding socioeconomic conditions like poverty and lack of healthcare can help allocate resources effectively. Early detection and prevention are key to reducing disabilities and stigma. Epidemiological data can aid in healthcare planning and funding for leprosy control programs.

# METHODS

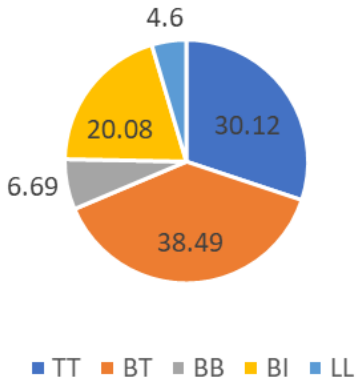
This retrospective study was conducted at Pathology department CMC (SMBBMU) Larkana, over a period from August 2023 to July 2024. Newly diagnosed leprosy cases were collected from various leprosy centers and clinics in interior Sindh over a four-year period (2019–2022). Patient data were extracted from medical records maintained at leprosy centers, including demographic variables such as age, gender, and residence. Leprosy cases were clinically classified based on the Ridley-Jopling classification into Borderline Tuberculoid (BT), Tuberculoid Tuberculoid (TT), Borderline Lepromatous (BL), Borderline Borderline (BB), and Lepromatous Lepromatous (LL). Additionally, cases were further categorized into Multibacillary (MB) and Paucibacillary (PB) according to WHO guidelines based on the Bacillary Index. Diagnosis was confirmed based on the presence of at least two cardinal signs of leprosy along with laboratory confirmation, including acid-fast positivity in a slit skin smear or biopsy report. This standardized methodology ensured the accurate classification and assessment of leprosy incidence in Sindh.

# RESULTS

In the study, a total of 239 new cases were collected from seventeen different leprosy centers and clinics located in different districts of interior Sindh during the period of four years, i.e., from 2019 to 2022.

**Table No.1: Demographic characteristics of study population**

| Variable | n(%) | |
|---|---|---|
| Gender | Male | 154 (64.43 %) |
| | Female | 85 (35.56%) |
| Age | 1-15 years | 57 (23.85%) |
| | 15-30 years | 86 (35.98%) |
| | 31-45 years | 74 (30.96%) |
| | 45 years and above | 22 (9.20%) |
| Residence | Urban | 82 (34.31%) |
| | Rural | 157 (65.69%) |




**Graph No.1: Different Types of Leprosy**

According to gender-wise data, male patients (64.43%) seemed to be somewhat more than female patients 85(35.56%). The mean age of all leprosy cases was 42.44 ± 10.22 years and ranged from 3 years to 59 years, while in the study, according to the 15–30-year-old age group 86 (35.9%), it affected more patients than 31–45-year-old patients 74(30.96%), and 57(23.85%) and 22(9.2%) seemed to be in the 1–15 years and 45 years and above groups. In addition, 157(65.69%) patients belonged to rural communities, and the remaining 82(34.31%) belonged to urban communities in the study.

In the study, the different types of leprosy, such as tuberculoid 86(35.98%), borderline tuberculoid 74(30.96%), borderline borderline (BB) 57(23.85%), borderline lepromatous (BL) 22 (9.2%), and lepromatous lepromatous (LL) 14 (3.69%), were the most prevalent forms of the illness in the said four-year period. Paucibacillary (PB) cases made up 67(28.04%), and multibacillary (MB) instances made up 172(70.96%). The year-wise leprosy data and types were presented in Tables 2, 3, 4, 5, and graph1 respectively.

**Table No.2: Various Types of Leprosy year-wise 2019**

| CENTERS 2019 | Types | | | | | | Types | | |
|---|---|---|---|---|---|---|---|---|---|
| Leprocy Center | T.T | BT | BB | BI | LL | Total | M.bac | P.bac | Total |
| LMC(Jam) | 1 | 4 | 0 | 0 | 1 | 6 | 6 | 3 | 9 |
| LFD (Hyd) | 5 | 1 | 0 | 1 | 0 | 7 | 3 | 3 | 6 |
| Thana Bola khan | 2 | 2 | 0 | 1 | 0 | 5 | 3 | 2 | 5 |
| Kotri KT | 3 | 2 | 0 | 0 | 0 | 5 | 3 | 3 | 6 |
| Thatta | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| Dadu | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 2 |
| Mirpur Khas | 0 | 1 | 1 | 3 | 0 | 5 | 5 | 0 | 5 |
| Badin | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| Sanghar | 0 | 0 | 2 | 1 | 0 | 3 | 4 | 0 | 4 |
| Nawabshah | 2 | 2 | 0 | 2 | 0 | 6 | 4 | 2 | 6 |
| Sakrand | 0 | 2 | 0 | 2 | 0 | 4 | 4 | 0 | 4 |
| Khairpur | 0 | 3 | 0 | 0 | 0 | 3 | 3 | 0 | 3 |
| Lakana | 0 | 3 | 0 | 2 | 1 | 6 | 6 | 0 | 6 |
| Shikarpur | 0 | 0 | 1 | 2 | 1 | 4 | 4 | 0 | 4 |
| Jacababad | 1 | 0 | 0 | 0 | 2 | 3 | 2 | 1 | 3 |
| KK | 3 | 4 | 1 | 3 | 0 | 11 | 5 | 2 | 7 |
| Mirpur Mathelo | 1 | 3 | 0 | 0 | 0 | 4 | 3 | 1 | 4 |
| Total | 21 | 27 | 6 | 17 | 5 | 76 | 56 | 20 | 76 |

**Table No.3: Various Types of Leprosy year-wise 2020**

| Centers 2020 | Types | | | | | | Type | | |
|---|---|---|---|---|---|---|---|---|---|
| Leprocy Center | T.T | BT | BB | BI | LL | Total | M.bac | P.bac | Total |
| LMC(Jam) | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 1 |
| LFD (Hyd) | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 4 |
| T B khan | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| Kotri KT | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 2 | 3 |
| Thatta | 1 | 1 | 0 | 1 | 1 | 4 | 1 | 0 | 1 |
| Dadu | 0 | 0 | 1 | 2 | 0 | 3 | 4 | 1 | 5 |
| Mirpur Khas | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| Badin | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Sanghar | 1 | 1 | 0 | 1 | 0 | 3 | 2 | 1 | 3 |
| Nawabshah | 1 | 2 | 0 | 0 | 0 | 3 | 2 | 1 | 3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sakrand | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 4 |
| Khairpur | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Lakana | 1 | 4 | 0 | 1 | 0 | 6 | 3 | 1 | 4 |
| Shikarpur | 0 | 1 | 0 | 1 | 1 | 3 | 2 | 1 | 3 |
| Jacababad | 0 | 1 | 0 | 1 | 0 | 2 | 2 | 0 | 2 |
| KK | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| M.Mathelo | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| Total | 12 | 17 | 2 | 7 | 2 | 40 | 28 | 12 | 40 |

**Table No.4: Various Types of Leprosy year-wise 2021**

| Centers 2021 | Types | | | | | | Type | | |
|---|---|---|---|---|---|---|---|---|---|
| Leprocy Center | T.T | BT | BB | BI | LL | Total | M.bac | P.bac | Total |
| LMC(Jam) | 1 | 1 | 0 | 1 | 0 | 3 | 3 | 1 | 4 |
| LFD (Hyd) | 2 | 1 | 1 | 1 | 0 | 5 | 4 | 1 | 5 |
| T B khan | 0 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 |
| Kotri KT | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 4 |
| Thatta | 2 | 0 | 0 | 1 | 0 | 3 | 1 | 1 | 2 |
| Dadu | 2 | 2 | 1 | 1 | 1 | 7 | 3 | 1 | 4 |
| Mirpur Khas | 0 | 0 | 0 | 2 | 0 | 2 | 1 | 1 | 2 |
| Badin | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Sanghar | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Nawabshah | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 1 | 2 |
| Sakrand | 1 | 2 | 1 | 1 | 0 | 5 | 3 | 1 | 4 |
| Khairpur | 1 | 2 | 0 | 0 | 0 | 3 | 2 | 0 | 2 |
| Lakana | 2 | 2 | 1 | 1 | 0 | 6 | 5 | 1 | 6 |
| Shikarpur | 1 | 3 | 0 | 0 | 0 | 4 | 2 | 1 | 3 |
| Jacababad | 1 | 2 | 0 | 0 | 0 | 3 | 2 | 2 | 4 |
| KK | 2 | 2 | 0 | 0 | 0 | 4 | 5 | 2 | 7 |
| M.Mathelo | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 |
| Total | 16 | 21 | 4 | 9 | 3 | 53 | 37 | 16 | 53 |

**Table No.5: Various Types of Leprosy year-wise 2022**

| **Centers** 2022 | Types | | | | | | Type | | |
|---|---|---|---|---|---|---|---|---|---|
| Leprocy Center | T.T | BT | BB | BI | LL | Total | M.bac | P.bac | Total |
| LMC(Jam) | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 2 |
| LFD (Hyd) | 2 | 1 | 1 | 1 | 1 | 6 | 4 | 2 | 6 |
| T B khan | 1 | 3 | 0 | 0 | 0 | 4 | 4 | 1 | 5 |
| Kotri KT | 1 | 1 | 0 | 0 | 0 | 2 | 3 | 1 | 4 |
| Thatta | 1 | 0 | 0 | 2 | 0 | 3 | 3 | 1 | 4 |
| Dadu | 1 | 2 | 0 | 1 | 0 | 4 | 3 | 1 | 4 |
| Mirpur Khas | 1 | 3 | 1 | 1 | 0 | 6 | 4 | 1 | 5 |
| Badin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Sanghar | 2 | 1 | 1 | 2 | 0 | 6 | 4 | 2 | 6 |
| Nawabshah | 2 | 2 | 0 | 2 | 0 | 6 | 3 | 2 | 5 |
| Sakrand | 1 | 2 | 0 | 0 | 0 | 3 | 3 | 0 | 3 |
| Khairpur | 2 | 0 | 0 | 1 | 0 | 3 | 2 | 1 | 3 |
| Lakana | 1 | 5 | 1 | 2 | 0 | 9 | 5 | 3 | 8 |
| Shikarpur | 2 | 3 | 0 | 1 | 0 | 6 | 4 | 0 | 4 |
| Jacababad | 1 | 2 | 0 | 1 | 0 | 4 | 3 | 1 | 4 |
| KK | 2 | 1 | 0 | 0 | 0 | 3 | 2 | 1 | 3 |
| M.Mathelo | 1 | 1 | 0 | 1 | 0 | 3 | 3 | 0 | 3 |
| Total | 23 | 27 | 4 | 15 | 1 | 70 | 51 | 19 | 70 |

# DISCUSSION

According to health data, it is observed that leprosy due to M. leprae infection affects 239 individuals, making it essential to have an effective leprosy control program. Due to the high prevalence of leprosy in the world's poorest regions, environmental variables such as unsanitary living conditions, overpopulation, and starvation may also be factors that favor the infection.[11]

Leprosy has been declining slowly but steadily in Pakistan, with the current prevalence ranging from 250 to 350 cases per year. For many years, Sindh province has borne the largest burden of serious illness, accounting for almost 40% of total new cases each year. Leprosy data for Pakistan highlight a long-term trend of fewer new cases being discovered, although more work is still needed to eradicate this disease. There were 397 new leprosy cases discovered in 2016, 40 of which were reported to be new cases.[12]

Following the policy of "the sooner the better," which calls for early diagnosis and adherence to multiple drug therapies, clinical workups on leprosy are conducted in all clinics and centers across the nation, including the districts of interior Sindh and nearby, which is an endemic region for leprosy in Pakistan.[13]

Clinics and centers play a critical role in diagnosis, registration, management, information, and record-keeping for the strategic plan to control illness in the region.

In this study, 239 leprosy cases were identified, of which 64% were male and 36% were female. A study conducted at the leprosy center in Karachi, shows 77% male and 23% female means a 3:2.1 ratio.[14]

A similar outcome was observed in a study conducted in China from 2010 to 2015, during which time 2900 new cases were discovered.[15] Although the age distribution of the patients appeared to be identical, an Indian retrospective study revealed a significant association between the different age groups.[16] Among these all cases, 134 were probably delayed diagnosed after 1 year, and this observation correlates with these studies.[17]

This can coincide with the WHO's objective of eradication whenever skilled technical staff members is working on the project, and general statistics on the subject frequently face issues with dependability due to missing data, differing policies for particular groups, and difficulty in diagnosis. It is necessary for the team involved to control the disease through NGOs and public institutes in the country.

# CONCLUSION

In a leprosy-endemic area, such data can help plan an effective control program in the region. Effective health interventions will be required among communities and health personnel to reduce morbidity and mortality.

**Author's Contribution:**

| | |
|---|---|
| Concept & Design or acquisition of analysis or interpretation of data: | Jaikishan, Vijia Kumar Gemnani, Kaleemullah Abro |
| Drafting or Revising Critically: | Om Parkash, Lubna Naz, Anoop Kumar |
| Final Approval of version: | All the above authors |
| Agreement to accountable for all aspects of work: | All the above authors |

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

**Source of Funding:** None

**Ethical Approval:** No.SMBBMU/CMC/Patho/774 dated 18.08.2023

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