Original Article

Reliance of Clinicians on Clinical diagnosis in Childhood Tuberculosis Patients

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Abstract:

Background: Childhood tuberculosis (CHTB) is an important indicator of recent community transmission and a major public health challenge in high-burden countries. Despite technological advances, most CHTB cases in Punjab, Pakistan, continue to be diagnosed clinically rather than bacteriologically.

Objective: To analyse the trends in bacteriological versus clinical diagnosis of CHTB in Punjab from 2021–2024, benchmark findings against national and international experiences, and identify programmatic gaps.

Methods: A secondary analysis of District Health Information System (DHIS-II) data from 2021–2024 was conducted. Data validation was performed by the data coordinators and district data focal persons by cross-checking online data with the hard copies of the quarterly reports at the hospitals and removing incomplete entries. CHTB cases were classified as bacteriologically confirmed (positive smear, Xpert MTB/RIF, or culture) or clinically diagnosed (symptoms, CXR, other tests without microbiological confirmation). Results were compared with WHO Global TB Reports and peer-reviewed literature from high- and low-burden countries.

Results: Between 2021 and 2024, CHTB accounted for 8.0-8.3% of total TB notifications in Punjab. Bacteriological confirmation rates remained stagnant at 20-23% until 2023, before improving to 29% in 2024. However, 71% of diagnoses still relied on clinical judgment. Compared to high-burden African countries (10-15%) and South Asian settings (8-20%), Punjab performed better, but confirmation rates lagged far behind low-burden countries (>60%).

Conclusion: While Punjab showed modest improvement in bacteriological confirmation, clinical diagnosis still dominates. Expanding child-friendly specimen collection (stool Xpert), decentralising molecular testing to primary care, and strengthening reporting systems remain priority actions to bridge the diagnostic gap.

Keywords: Childhood tuberculosis, Bacteriological confirmation, Clinical diagnosis, Punjab, Pakistan

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Introduction:

Globally, in 2023 an estimated 10.8 million people developed TB, including 1.3 million children (12% of cases). Children under five are at highest risk of progression and mortality, accounting for 16–20% of TB deaths in children (1).

Pakistan ranks 5th among high-burden countries, with children comprising 14% of national TB notifications in 2023, the majority (90%) were clinically diagnosed (1, 11). Punjab, the largest province, reported 8% of TB cases as CHTB, with a higher reliance on clinical diagnosis compared to bacteriological confirmation. Given the critical importance of bacteriological evidence for accurate case detection and drug resistance

surveillance, this study analyses provincial trends and compares Punjab's diagnostic profile with global benchmarks.

Material and Methods:

Childhood tuberculosis (TB) notification data from 2021 to 2024 were extracted from the DHIS-II platform, which serves as the routine surveillance system across all 558 Basic Management Units (BMUs) in Punjab, including the private sector. Data validation was performed using quarterly and annual reports from the Provincial TB Control Program. At the district level, DHIS data were cross-checked by district data focal persons and provincial data coordinators, and incomplete entries were excluded. In accordance with the National TB Case Management Guidelines, cases were classified as either bacteriologically confirmed or clinically diagnosed. Bacteriologically confirmed cases included those with positive smear microscopy, Xpert MTB/RIF, or culture results, while clinically diagnosed cases were based on symptom assessment, chest X-ray (CXR), or other supportive tests in the absence of bacteriological confirmation. Year-wise proportions of bacteriological versus clinical diagnoses were calculated, and comparative analyses were conducted using WHO Global TB Reports (2023–2024) and peer-reviewed studies from Africa, South Asia, and Europe.

Result

Table 1. Childhood TB in Punjab: 2021-2024

Year	Total TB cases	Childhood TB Cases (%)	Bacteriological n (%)	Clinical n (%)
2021	209,885	16,038 (8.0%)	3,714 (23%)	12,324 (77%)
2022	258,799	20,586 (8.3%)	4,409 (21%)	16,177 (79%)
2023	277,149	23,142 (8.2%)	4,670 (20%)	18,472 (80%)
2024	290,647	24,456 (8.1%)	5,059 (29%)	19,397 (71%)

- Bacteriological confirmation increased slightly from 20% (2023) to 29% (2024), however, clinical diagnosis remains dominant at 71%.

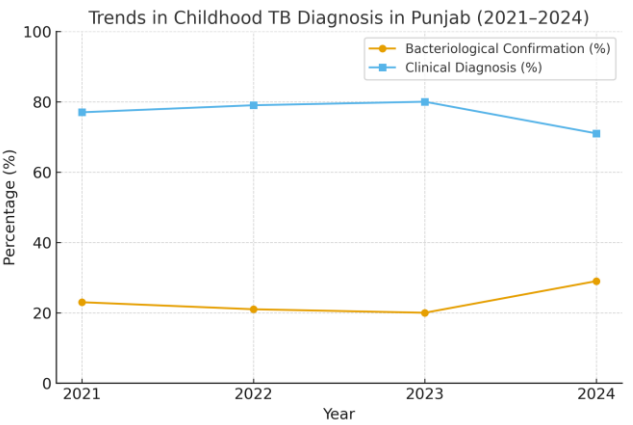

Figure 1 shows the proportion of bacteriological versus clinical diagnosis in childhood TB cases reported in Punjab from 2021 to 2024. While bacteriological confirmation improved slightly in 2024 (29%), clinical diagnosis continues to dominate (71%).

Discussion

Punjab's data confirm that reliance on clinical diagnosis continues to dominate in childhood TB, with 71% of cases in 2024 still lacking bacteriological confirmation despite modest improvements (29% in 2024 vs. 20–23% in 2021–2023) (4). This trend aligns with high-burden countries such as Nigeria (12%) and Ethiopia (15%) (6,7), and with South Asian settings like India (8–20%) and Bangladesh (12%) where clinical diagnosis remains the primary diagnostic pathway (8,11). However, in comparison to the developed countries, Punjab lags far behind low-burden countries in Europe and North America, where systematic sample collection and strong contact tracing yield >60% bacteriological confirmation (3,9). Evidence from Uganda and Tanzania shows that scaling up stool Xpert and decentralised molecular testing can nearly double bacteriological yield (12%→28%) (10,16), and India has documented similar gains through stool and gastric aspirate testing (8,11). At the national level, Pakistan still reports that over 90% of childhood TB notifications are clinically diagnosed (1,11), highlighting systemic barriers such as limited child-friendly specimen collection, restricted lab access, and incomplete hospital/private sector reporting. Collectively, these findings position Punjab within the global high-burden pattern, while underlining the urgent need to decentralize molecular diagnostics, expand stool/gastric aspirate testing, and strengthen surveillance to move closer to international best practice.

Programmatic gaps in Punjab:

1. **Specimen collection & testing access** – Limited paediatric sample collection (stool and gastric aspirate) facility at Basic health Units (BHUs) and Rural Health Centers (RHCs). Gene Xpert availability confined to Tehsil Head Quarters (THQs), District Head Quarters (DHQs), and tertiary care hospitals, which may result in the easiness of the clinicians and dependence on the CXR, and clinical symptoms, in the peripheral health facilities instead of collecting samples and sending to THQs and DHQs labs for the bacteriological evidence.
2. **Reporting gaps** – Under-reporting from tertiary care hospitals and private clinicians
3. **No formal contact tracing system** – No formal contact tracing system exists in the community or in the hospitals for early detection of the CHTB cases from the household contacts of bacteriological positive cases, therefore, limited diagnostic facilities and access of contacts, potentially increasing missed cases..

Conclusion

Punjab's childhood TB diagnostic profile remains dominated by clinical diagnosis, though modest progress was observed in 2024. To close the gap with global best practice, the following actions are critical:

- Decentralise molecular testing to peripheral facilities enhancing lab capacity.
- Scale up child-friendly diagnostic innovations (stool Xpert, gastric aspirates).
- Strengthen household TB contact tracing in adults and children diagnosed cases.

- Improve completeness of hospital and private sector reporting.

Such interventions could substantially raise bacteriological confirmation, improve resistance detection, and enhance treatment outcomes.

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