

Original Article

## Clinico-epidemiological Profile of Pediatric Tuberculosis in a District of Assam

Tulika Goswami Mahanta<sup>1</sup>, Malinee Goswami<sup>1</sup>, Nabanita Nirmolia<sup>1</sup>, Baidurjya Mahanta<sup>1</sup>, Ravi Baruah<sup>2</sup>, Bupendra N. Mahanta<sup>3,4</sup>

Departments of <sup>1</sup>Community Medicine and <sup>2</sup>TB and Chest, Assam Medical College and Hospital, Dibrugarh, <sup>3</sup>Department of Medicine, Lakhimpur Medical College and Hospital, Chowkham, <sup>4</sup>Department of Medicine, Assam Medical College and Hospital, Dibrugarh, Assam, India.

**\*Corresponding author:**

Malinee Goswami,  
Department of Community  
Medicine, Assam Medical  
College and Hospital,  
Dibrugarh, Assam, India.

[dmalineegoswami30@gmail.com](mailto:dmalineegoswami30@gmail.com)

Received: 11 February 2025

Accepted: 25 March 2025

Published: 05 September 2025

**DOI**

10.25259/JCH\_5\_2025

**Quick Response Code:**



### ABSTRACT

**Background:** India accounts for 27% of global tuberculosis (TB) cases with 8–20% of TB-related deaths. Children account for 5% of new TB cases. This study investigates clinical characteristics and treatment outcomes of pediatric TB patients at in a District of Assam.

**Objectives:** The objectives of the study are to assess the profile of pediatric TB patients registered in the DTC of a tertiary care hospital.

**Material and Methods:** One-year retrospective analysis of 241 TB patients from the Nikshay portal between January 23 and June 24. Data collection focused on sociodemographics, clinical variables, and outcomes.

**Results:** Of the total 241 TB patients, the mean age was  $11.25 \pm 3.8$  years and the majority were females. Most availed public hospital care (84.2%), and the majority (31.5%) visited DTC. Newly diagnosed cases were 85.1%, while 2.1% had drug-resistant TB. Pulmonary TB comprised 51% and extrapulmonary TB was 42.3% mostly affecting lymph nodes (10.7%). Nearly 51.87% of patients completed their treatment and girls exhibited a higher cure and treatment completion rate.

**Conclusion:** The majority received services from district hospitals, while peripheral centers were less utilized. Drug resistance requires better attention to prevent further transmission and mortality.

**Keywords:** District tuberculosis center, Extra-pulmonary tuberculosis, Pediatric tuberculosis, Pulmonary tuberculosis

### INTRODUCTION WITH OBJECTIVES

Tuberculosis (TB), primarily an airborne infectious disease, occurs in 0.6–3.6% of children.<sup>1</sup> Pulmonary TB (PTB) is more common than extrapulmonary.<sup>2</sup> Globally, TB continues to be a major public health challenge, particularly in low-and middle-income countries.<sup>3</sup> Estimated latent infections of 25% led to a globally increased risk of developing active TB and impact among youngsters.<sup>4</sup> Although TB is preventable and curable with established and emerging treatments, it continues to be a significant cause of mortality, even in developed countries.<sup>5</sup> The World Health Organization's (WHO) End TB Strategy targets a 95% reduction in TB deaths and a 90% decrease in TB incidence between 2015 and 2035, ensuring no households face catastrophic financial costs due to TB.<sup>6</sup>

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

©2025 Published by Scientific Scholar on behalf of Journal of Comprehensive Health

Children account for around 6% of TB cases, and this percentage is rising above 10% in some specific states including Northeast.<sup>7</sup> Many children with TB are identified and taken care of in India's large private healthcare industry as evident from Nikshay, Ministry of Health and Family Welfare's case-based notification portal. As numerous private practitioners fail to notify cases, the total prevalence of childhood TB in the nation is still uncertain.<sup>8</sup> PTB is more common in children, with only 20–30% of cases being extra-pulmonary TB (EPTB), involving lymph glands, meninges, skeletal system, skin, gastrointestinal tract, and other organs.<sup>9</sup>

Northeast India is one of the regions with a high TB burden. Despite efforts under the National TB Elimination Program, the challenge of TB remains significant due to factors such as delayed diagnosis, lack of awareness, and underreporting, particularly in pediatric populations. In Assam, 78.4% of TB cases were notified in 2022.<sup>10</sup> Therefore, this study was conducted to assess the clinical-epidemiological profile of pediatric TB in a District of Assam.

## MATERIAL AND METHODS

### Study design

Secondary data analysis from NIKSHAY portal and Department of Pulmonary Medicine from January 2023 to June 2023.

### Site of the study

District of Assam.

### Sample size

Taking the prevalence of childhood TB as 3.6% with 20% relative precision and 95% confidence level, the required sample size was 171; calculation was done using nMaster2.0' (nMaster sample size calculator version 2.0 software, Christian Medical College, Vellore, India).

### Study participants

All childhood TB patients registered under NIKSHAY were included. Inclusion criteria are defined as those aged 0–15 years diagnosed with TB at the DTC during the study period. Exclusion criteria were patients with incomplete medical records.

### Study variables

Sociodemographic variables such as age and sex and clinical variables such as site of disease and treatment outcome.

## Data management and cleaning

All the data were imported in Microsoft Excel 2024 and checked manually. IBM Statistical Package for the Social Sciences software version 21, South Asia, was used for descriptive analysis.

## Ethical consideration

Institutional Ethics Committee (IEC) clearance was obtained from the Institutional IEC Committee (H).

## Statistics

Descriptive data were presented in the form of numbers, percentages, and diagrams. A comparison of variables for EPTB and PTB outcome was done using the Chi-square test along with the odds ratio.

## RESULTS

### Demographic characteristics

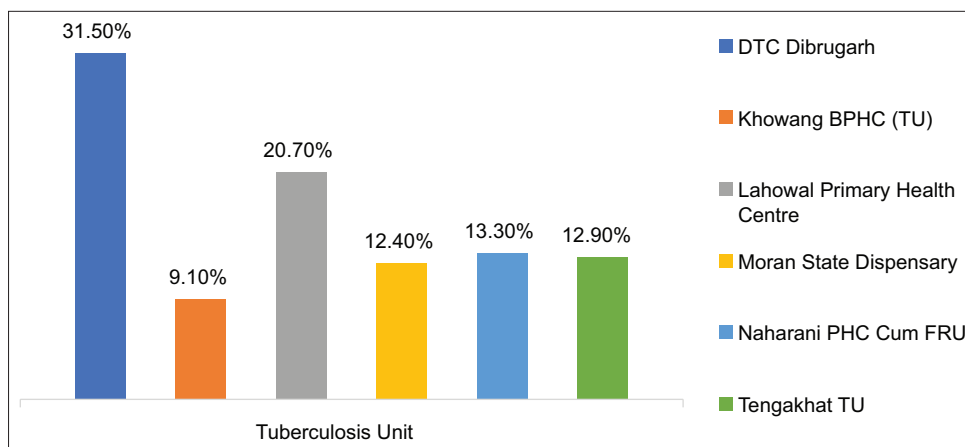
A total of 241 pediatric TB patients were included. The mean age of children was  $11.25 \pm 3.8$  years and the majority were girls (141 [58.5%] females and 100 [41.5%] males). Tea garden communities were more affected by 66.8% (161), compared to 33.2% (80) from non-tea garden communities [Table 1].

### Healthcare seeking behavior of pediatric TB patients

The majority 84.2% (203) were treated in public healthcare facilities, while 38 (15.8%) went to private hospitals. DTC Dibrugarh had the most patients 76 (31.5%), while among rural block primary health centers (PHCs), Lahowal PHC TB unit-IV had 50 (20.7%) patients, Naharani PHC cum first referral unit reported 32 (13.3%) patients, Moran State Dispensary had 30 (12.4%) patients, Tengakhat (TB Unit)

**Table 1:** Demographic characteristics.

Variables	Frequency <i>n</i> (%)
Age	
0–<5 years	18 (7)
5–<10 years	56 (23)
10–<15 years	157 (69)
Gender	
Males	100 (41.5)
Females	141 (58.5)
Community	
Tea garden	161 (66.8)
Non-tea garden	80 (33.2)



**Figure 1:** Distribution of pediatric tuberculosis (TB) patients in TB units. DTC: District tuberculosis centre, Dibrugarh, BPHC (TU): Block primary health centre (Tuberculosis unit), PHC: Primary health centre, FRU: First referral unit, TU: Tuberculosis Unit

had 31 (12.9%) patients, and Khowang block PHC (TB Unit) included 22 (9.1%) patients [Figure 1].

These findings highlight that the DTC Dibrugarh received more patients while the Khowang Block PHC (TB Unit) received a smaller number of patients.

### Clinical presentation of pediatric TB patients

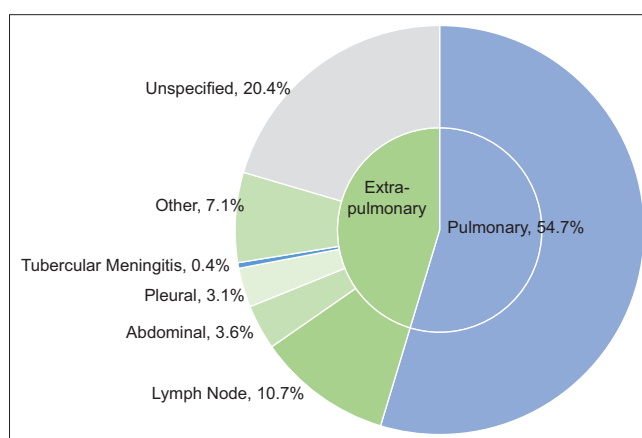
Distribution of TB cases as shown in Table 2 indicates that 205 (85.1%) were classified as new cases, and 5 (2.1%) patients required programmatic management of drug-resistant TB (PMDT). Other previously treated cases accounted for 3.3% (8) and 0.8% (2) patients had recurrent TB. In addition, data for 20 (8.3%) patients were classified as not available (NA). This highlights the predominance of new TB cases, with fewer re-treatment and drug-resistant cases.

Distribution of TB cases by site of disease indicates that 123 (51.0%) patients were diagnosed with PTB, while 102 (42.3%) patients had EPTB. Extrapulmonary was significantly higher in boys whereas in girls, PTB is predominant [Table 3].

Among the extra-pulmonary cases, 20.4% of patients fall into an unspecified category, while lymph node was involved in 10.7% of cases. Abdominal TB was seen in 3.6%, pleural TB in 3.1% of patients, and other forms contributed 7.1%. Tubercular meningitis, a rare but severe form of TB, accounted for 0.4% of cases [Figure 2]. This distribution highlights the significant burden of EPTB, with lymph node involvement being the most common among these.

### Treatment outcomes

In Table 4, out of 241 patients, 125 completed their treatment, 16 had been cured, while 13 died. In addition, 5.39% were classified under the “Others” category comprising of non-



**Figure 2:** Distribution of tuberculosis cases by site of diseases.

**Table 2:** Distribution of tuberculosis by type of cases and site of diseases.

Type of cases	Frequency n (%)
New case	205 (85.1)
Other previously treated	8 (3.3)
Drug-resistant tuberculosis	5 (2.1)
Recurrent tuberculosis	2 (0.8)
Treatment after loss to follow-up	1 (0.4)
Not applicable (N/A)	20 (8.3)

evaluation of results, loss to follow-up, patient refusal, etc. This distribution indicates that, while the majority of patients had positive treatment outcomes, a considerable number of unclassified outcomes may require further investigation to determine the reasons behind these outcomes.

Treatment outcomes by gender show some notable differences between boys and girls. Girls show a higher cure

rate (81% vs. 19%) and treatment completion (59% vs. 41%) compared to boys. Results were NA in 40 (54%) girls and 34 (46%) boys.

According to the India TB Report 2024, the treatment outcome of pediatric TB patients notified in 2022 is shown in Table 5. Table 5 shows the comparison of treatment outcomes of Pediatric TB patients notified in 2022. The finding of the study shows that the treatment outcomes for pediatric TB are categorized into cured, died, lost to follow-up, treatment

regimen changed, not evaluated, success rate, treatment failure rate, and other/unclassified. In Dibrugarh, the cured rate is 16 (6.64%) which is lower than Assam's (13.3%) and India's (9.9%) cured rate. The death rate in Dibrugarh is 5% out of 241 patients notified which is higher than Assam (2%) and India (1.3%). Dibrugarh district had a lower rate of loss to follow-up (0.4%), compared to Assam (1%) and India (1.9%).

## DISCUSSION

Population living in tea gardens were found more vulnerable indicating the necessity for a more focused intervention design to protect them. The term "key and vulnerable populations" refers to groups that are more susceptible to TB bacilli, have limited access to healthcare because of socioeconomic determinants of health, or have a higher chance of developing TB because of weakened immune systems.<sup>11</sup> Among pediatric TB in the 0–15 years age group, our study documented more girls were affected than boys. A similar study in Delhi showed a higher prevalence of TB among the female population 651 (61%) than male 420 (40%). Regarding the utilization of health services, the majority were treated in public healthcare facilities. This finding supports the results of previous studies, which show that public healthcare facilities are often the primary source of TB care due to their accessibility and affordability.<sup>10,12</sup> DTC Dibrugarh catered to most patients, while rural primary healthcare centers got a lesser number of people, despite the urban: rural ratio of 18:82 in Dibrugarh District. The increased number of patients at DTC Dibrugarh may be due to its central location (accessibility) and better healthcare infrastructure (availability). To justify this statement, recent papers from the year 2019 reported that urban center with better resources tends to manage a larger proportion of TB patients.<sup>9,13</sup>

There is a predominance of new TB cases, followed by re-treatment cases PMDT, and recurrent TB. A similar finding

**Table 3:** Comparison of extrapulmonary and pulmonary patients according to gender, age group, and community.

Variables	Extrapulmonary	Pulmonary
Not applicable (N/A) (16)	102	123
Gender (%)		
Females	53 (40)	81 (60)
Males	49 (54)	42 (46)
Age (%)		
0–<5 years	10 (83)	2 (17)
5–<10 years	35 (69)	16 (31)
10–<15 years	57 (35)	105 (65)
Community (%)		
Tea garden	61 (40)	90 (60)
Non-teagarden	41 (55)	33 (45)

**Table 4:** Distribution of treatment outcomes.

Treatment outcomes	Frequency n (%)
Treatment completed	125 (51.87)
Cured	16 (6.64)
Died	13 (5.39)
Not applicable (N/A)	74 (30.71)
Others	13 (5.39)

**Table 5:** Comparison of treatment outcomes of pediatric TB patients notified in 2022.

Treatment outcome	Dibrugarh study data (%)	Assam data as per India TB report 2024 (%)	India data as per India report 2024 (%)
Cured	16 (6.64)	177 (13.3)	12512 (9.9)
Died	13 (5)	27 (2)	1639 (1.3)
Lost to follow-up	1	13 (1)	2356 (1.9)
Treatment regimen changed	1	5 (0.4)	900 (0.7)
Not evaluated	8 (3)	6 (0.5)	709 (0.6)
Treatment failure rate	2 (1)	8 (0.6)	632 (0.5)
Other/unclassified	75 (31)	0	0
TB patients notified	241	1330	126180

Source: India TB Report 2024<sup>11</sup>

was reported in another study done in 2019 indicating the recurrence of the same situation.<sup>14</sup> Distribution of TB showed that the majority had PTB, followed by extrapulmonary, indicating the relevance of implementation of primary prevention strategies for airborne droplet transmission. Among, EPTB cases, glandular, abdominal, and pleural were common. Similar studies showed the most common type as pulmonary followed by extra-pulmonary including neurological, abdominal and military, osteoarticular, tubercular lymphadenitis, and disseminated TB.<sup>15,16</sup> The WHO strongly recommends screening for early detection and treatment to avoid catastrophic costs and health deterioration among high-risk individuals.<sup>17</sup>

Treatment outcomes in pediatric TB revealed only 51.87% treatment completion and 6.64% cure rate, indicating the need for focus attention in managing such cases. While other studies showed better treatment outcomes.<sup>9,14</sup> This indicates the need to implement more patient-centered interventions, increase healthcare provider training, and improve access to effective TB medications, especially in cases of suspected drug resistance.<sup>4</sup>

### Limitation

While this study on pediatric TB provides important insights, several limitations should be recognized. Although the sample size is adequate, it may not completely represent the wider pediatric population as many cases go unreported, which restricts the generalizability of the findings. Furthermore, the study did not thoroughly investigate factors affecting treatment adherence. Further, community-based studies and implementation research need to be conducted to address the issue.

### CONCLUSION

A lower cure rate and more vulnerability to the tea garden population need to be addressed. As most cases came to a central location for accessing service, improving decentralized service delivery may prove effective through better accessibility and utilization of services.

**Ethical approval:** The research/study was approved by the Institutional Review Board at Assam Medical College and Hospital, approval number AMC/EC/1920, dated 13th May, 2024.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent.

**Financial support and sponsorship:** Nil.

**Conflicts of interest:** There are no conflicts of interest.

**Use of artificial intelligence (AI)-assisted technology for manuscript preparation:** The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

### REFERENCES

1. World Health Organization Incidence. In: Global Tuberculosis Report 2023. Geneva: World Health Organization; 2023. Available from: <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2023/tb-disease-burden/1-1-tb-incidence> [Last accessed on 2024 Oct 09].
2. Ksoo R, Barman H, De M, Lynser D, Duwarah SG, Lyngdoh C. Clinical Profile of Pediatric Tuberculosis in a Tertiary Hospital in Northeast India: A Retrospective Analysis. *Cureus* 2023;15:e38660.
3. Tobin EH, Tristram D. Tuberculosis. In: StatPearls. Treasure Island, FL: StatPearls Publishing; 2024. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK441916> [Last accessed on 2024 Sep 02].
4. Ohene SA, Fordah S, Dela Boni P. Childhood Tuberculosis and Treatment Outcomes in Accra: A Retrospective Analysis. *BMC Infect Dis* 2019;19:749.
5. Hood G, Trieu L, Ahuja SD. Mortality among Tuberculosis Patients in New York City. *Int J Tuberc Lung Dis* 2019;23:252-9.
6. Deutsch-Feldman M, Pratt RH, Price SF, Tsang CA, Self JL. Tuberculosis - United States, 2020. *Morb Mortal Wkly Rep* 2021;70:409-14.
7. Dhaked S, Sharma N, Chopra KK, Khanna A, Kumar R. Socio-demographic Profile and Treatment Outcomes in Pediatric TB Patients Attending DOTS Centers in Urban Areas of Delhi. *Indian J Tuberc* 2019;66:123-8.
8. Swaminathan S, Sachdeva KS. Treatment of Childhood Tuberculosis in India. *Int J Tuberc Lung Dis* 2015;19:43-6.
9. Rajkhowa J, Ahmed SJ, Mahanta TG, Gogoi G. Treatment Outcome of Tuberculosis Patients in the Directly Observed Treatment Short Course Centres of Dibrugarh, Assam. *Int J Community Med Public Health* 2024;11:2751-5.
10. Kayina TK, Tarao MS, Nula P. Tuberculosis in North-East India: Patient Profile and Treatment Outcome of Patients Attending RNTCP. *Int J Community Med Public Health* 2019;6:2856-60.
11. Ministry of Health and Family Welfare, Government of India. TB Report for Web 2024.; 2024. Available from: [https://tbcindia.mohfw.gov.in/wp-content/uploads/2024/10/TB-Report\\_for-Web\\_08\\_10-2024-1.pdf](https://tbcindia.mohfw.gov.in/wp-content/uploads/2024/10/TB-Report_for-Web_08_10-2024-1.pdf) [Last accessed on 2024 Nov 18].
12. Haldane V, Zhang Z, Ma Q, Yin T, Zhang B, Li Y, *et al.* A Qualitative Study of Perspectives on Access to Tuberculosis Health Services in Xigaze, China. *Infect Dis Poverty* 2021;10:120.
13. Mutembo S, Mutanga JN, Musokotwane K, Kanene C, Dobbin K, Yao X, *et al.* Urban-Rural Disparities in Treatment Outcomes among Recurrent TB Cases in Southern Province, Zambia. *BMC Infect Dis* 2019;19:1087.
14. Arinaminpathy N, Batra D, Maheshwari N, Swaroop K, Sharma L, Sachdeva KS, *et al.* Tuberculosis Treatment in the Private Healthcare Sector in India: An Analysis of Recent Trends and Volumes Using Drug Sales Data. *BMC Infect Dis* 2019;19:539.
15. Sood N, Wagner Z. Impact of Health Insurance for Tertiary Care on Postoperative Outcomes and Seeking Care for Symptoms: Quasi-Experimental Evidence from Karnataka,

India. *BMJ Open* 2016;6:e010512.

16. Kakroo AA, Ahmad S, Wani MA. Spectrum of Paediatric Tuberculosis at a Tertiary Care Children's Hospital in Kashmir: A Prospective Study. *Int J Contemp Med Res IJCMR* 2019;6:L4-8.
17. World Health Organization. Tuberculosis: Systematic Screening. Available from: <https://www.who.int/news-room/>

questions-and-answers/item/systematic-screening-for-tb [Last accessed on 2025 Mar 21].

**How to cite this article:** Mahanta TG, Goswami M, Nirmolia N, Mahanta B, Baruah R, Mahanta BN. Clinico-epidemiological Profile of Pediatric Tuberculosis Pediatric Tuberculosis Profile in a District of Assam. *J Compr Health*. 2025;13:158-63. doi: 10.25259/JCH\_5\_2025