

Programmatic Management of TB–HIV Co-infection in Punjab, Pakistan: Epidemiology, Integration Gaps and Lessons from Global Experience

Dr. Shafia Tayyab¹

Abstract

Tuberculosis (TB) remains a major global health challenge and is the leading cause of death among people living with Human Immunodeficiency Virus (HIV). HIV infection significantly increases the risk of developing active TB disease. According to global estimates, people living with HIV (PLHIV) are 15–22 times more likely to develop TB compared to HIV-negative individuals. Pakistan is among the top five TB burden countries, and Punjab, the most populous province of Pakistan, contributes the largest share, 60% of tuberculosis cases in the country. This study examines the epidemiology, programmatic response, and service integration gaps in the management of TB-HIV co-infection in Punjab using provincial surveillance data from 2024. In 2024, a total of 290,647 TB cases were reported in Punjab, of which 81% were screened for HIV, and 0.1% were HIV positive. Among PLHIV, 4.3% were diagnosed with TB following screening. Despite high levels of antiretroviral therapy coverage among co-infected patients, TB preventive therapy (TPT) coverage remains extremely low 4.2%. Lessons from other countries such as India, South Africa, and the United Kingdom demonstrate the effectiveness of integrated TB-HIV service delivery models and robust surveillance systems. Strengthening bidirectional screening, improving TB preventive therapy coverage, integrating surveillance systems, and expanding public-private partnerships are essential for improving TB-HIV management in Punjab.

Keywords: Tuberculosis, HIV, TB-HIV co-infection, Punjab, Pakistan, integrated health services

Date Submitted: 16th January 2026 **Last Modified:** 20th January 2026 **First Published:** 23rd January 2026

¹MBBS, MHA, MCPS, MPH (UK)

Introduction

Tuberculosis and Human Immunodeficiency Virus represent two of the most significant infectious disease challenges globally. HIV infection weakens the immune system, significantly increasing susceptibility to tuberculosis infection and disease progression. Globally, approximately 10.6 million people developed TB in 2022, and nearly 6% of these cases were co-infected with HIV¹

People living with HIV are estimated to be 15–22 times more likely to develop active tuberculosis than HIV-negative individuals¹ The dual

epidemic of TB and HIV has particularly affected low- and middle-income countries where health systems face limitations in resources, infrastructure, and disease surveillance²

Pakistan ranks among the top five high-burden tuberculosis countries globally¹. Although HIV prevalence in Pakistan remains relatively low compared to many countries in sub-Saharan Africa, the number of HIV infections has increased over the past decade, partly due to outbreaks in several provinces and improved detection systems³

Punjab, the largest province of Pakistan, contributes the highest number of TB notifications in the country. The integration of TB and HIV services has become an essential public health strategy to reduce morbidity and mortality associated with co-infection.

This article analyzes the epidemiological trends of TB-HIV co-infection in Punjab and compares programmatic approaches with those implemented in other developing and developed countries.

Methods

Study Design

Retrospective cross-sectional secondary data analysis.

Study Setting

Public & private sector healthcare facilities across Punjab province, Pakistan.

Study Period

January 2024 to December 2024.

Study Population

All notified TB – HIV cases in 2024

Data Source and Analysis

Routine quarterly surveillance data obtained from the Punjab Tuberculosis Control Program were extracted from the District Health Information System (DHIS-2) and programmatic reports used for TB-HIV coordination meetings in Punjab. Data were analyzed using descriptive statistics including frequencies and proportions across four quarters. Inferential statistical testing was not conducted due to the aggregated nature of programmatic data. Comparative evidence from other countries was obtained from peer-reviewed literature, WHO reports, and global TB-HIV policy documents published between 2010 and 2024.

Key indicators analyzed included:

- Total TB case notifications
- HIV screening among TB patients
- TB screening among PLHIV
- TB-HIV co-infection prevalence
- Antiretroviral therapy (ART) coverage
- TB preventive therapy (TPT) coverage

Ethical Considerations

As part of the research team, the study utilized routine DHIS-2 program data; confidentiality of the patients was maintained. Formal ethical review was not required for secondary program analysis.

Results

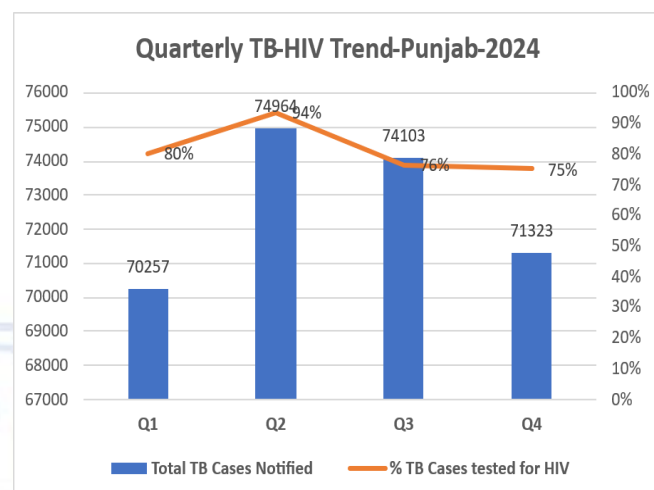
Epidemiology of TB-HIV Co-infection in Punjab

In 2024, a total of 290,647 tuberculosis cases were notified in Punjab. Among these cases, 236,718 patients (81%) were screened for HIV, and 381 individuals (0.1%) tested positive. Among the HIV program cohort, 6,557 new HIV cases were reported, and 5,383 PLHIV (82%) were screened for TB. Of these, 236 individuals (4.3%) were diagnosed with tuberculosis. Antiretroviral therapy coverage among TB-HIV patients remained relatively high, with 92% of co-infected patients receiving ART. However, TB preventive therapy coverage among PLHIV remained extremely low; out of 5,147 eligible individuals, only 207 (4.2%) were initiated on TPT.

Table 1: TB-HIV Epidemiological Indicators in Punjab (2024)

Indicator	Value
Total TB cases notified	290,647
TB patients screened for HIV	236,718 (81%)

TB patients HIV positive	381 (0.1%)
TB-HIV patients receiving ART	349 (92%)
New cases reported for HIV	6557
PLHIV screened for TB	5,383 (82%)
PLHIV diagnosed with TB	236 (4.3%)
PLHIV eligible for TPT	5,147
PLHIV started on TPT	207 (4.2%)



Quarter	Total	Public Sector	Private Sector
Q1	70,257	44,632	25,625
Q2	74,964	47,417	27,547
Q3	74,103	46,093	28,010
Q4	71,323	36,817	34,506

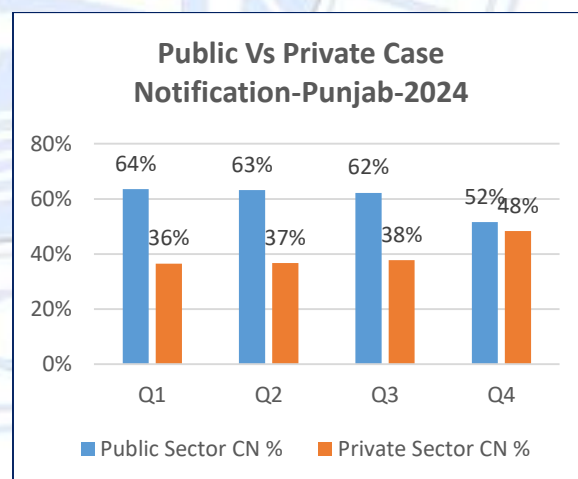
Table 2: Quarterly TB and HIV Screening Trends in Punjab in 2024

Quarter	TB Cases Notified	TB Patients Screened for HIV	% TB Cases tested for HIV
Q1	70,257	56,311	80%
Q2	74,964	70,130	94%
Q3	74,103	56,663	76%
Q4	71,323	53,614	75%

These findings demonstrate substantial progress in HIV testing among TB patients, although variability in screening coverage across quarters suggests operational challenges at the facility and district levels.

Public and Private Sector Contribution

Table 3: Public vs Private TB Case Notification in Punjab (2024)



The data indicate a gradual increase in private sector contribution, from 36% to 48%, reflecting the importance of the Public-Private Mix (PPM) model in TB case detection in the Punjab.

Discussion

The findings highlight several key programmatic strengths and gaps in TB-HIV management in Punjab. Bidirectional screening coverage has improved significantly, with more than 80% of TB patients being screened for HIV. This is comparable to several developing countries implementing collaborative TB-HIV activities⁴. However, TB preventive therapy coverage remains extremely low, as preventive therapy is one of the most effective interventions to reduce TB incidence among PLHIV⁵.

Several countries have demonstrated successful integration of TB and HIV services. In South Africa, integrated TB-HIV services within primary healthcare facilities have resulted in ART coverage exceeding 90% and TPT coverage reaching more than 70% among PLHIV⁶. Similarly, India has implemented a national TB-HIV collaborative framework that ensures routine HIV testing among TB patients and TB screening among PLHIV, supported by digital surveillance systems⁷. In Nigeria, community-based TB screening and integrated HIV clinics have improved detection of co-infection and strengthened treatment adherence.

In contrast, developed countries such as the United Kingdom and the United States have adopted fully integrated clinical services and real-time electronic surveillance systems that allow simultaneous management of TB and HIV patients^{9,10}.

Punjab has achieved high ART coverage among TB-HIV patients; however, several challenges remain, including fragmented, uncoordinated surveillance information systems, weak

integration at the facility level, and limited TPT implementation.

Programmatic Gaps and Policy Recommendations in Punjab.

Several challenges limit optimal TB-HIV management:

1. Lack of integrated TB-HIV policy implementation at district level
2. Separate surveillance systems for TB and HIV programs
3. Low TB preventive therapy (TPT) coverage among PLHIV in Punjab (4.2%)
4. Stigma and discrimination related to HIV infection among healthcare workers and the community
5. Limited integrated TB-HIV monitoring mechanisms at the health facility and district level

To improve TB-HIV management as a co-infection in Punjab, the following strategies are recommended:

- Integration of TB and HIV services at the facility and district level
- Expansion of TB preventive therapy among PLHIV
- Development of integrated digital surveillance systems
- Strengthening public-private collaboration for HIV testing among TB patients
- Capacity building of primary healthcare workers on TB-HIV management as a co-infection
- Community-based screening and awareness campaigns to reduce stigma

Strengths of the Study

- Province-wide programmatic dataset covering a large population
- Real-world evidence reflecting health system performance
- Policy-relevant findings aligned with provincial and national TB strategy
- Comparison across private and public levels of healthcare

Limitations

- Use of aggregated data limits individual-level analysis
- Possible under-reporting from private sector facilities
- Lack of information on diagnostic methods and outcomes
- Inability to assess delays in diagnosis or treatment
- Findings are limited to Punjab province.
- Reliance on a single data source (DHIS-2) may not capture cases managed entirely within private facilities that do not report to the system.

Conclusion

TB-HIV co-infection remains an important public health challenge in Punjab. While significant progress has been made in TB case detection and antiretroviral therapy coverage, major gaps remain in preventive therapy, service delivery, and surveillance integration. Lessons from other countries highlight the importance of integrated service delivery, strong surveillance systems, and preventive interventions. Strengthening collaboration between TB and HIV programs will be essential for achieving national and global TB elimination targets.

Conflict of Interest

The author declares no conflict of interest.

Funding

No external funding was received for this study.

References

1. World Health Organization. *Global tuberculosis report 2023*. Geneva: World Health Organization; 2023. Report No.: WHO/UCN/TB/2023.7.
2. World Health Organization. *Global tuberculosis report 2022*. Geneva: World Health Organization; 2022. Report No.: WHO/UCN/TB/2022.25.
3. UNAIDS. *Global HIV & AIDS statistics: 2024 fact sheet*. Geneva: UNAIDS; 2024.
4. Suthar AB, Lawn SD, del Amo J, Getahun H, Dye C, Gilks CF, et al. Antiretroviral therapy for prevention of tuberculosis in adults with HIV: a systematic review and meta-analysis. *PLoS Med*. 2012;9(7):e1001270.
5. Getahun H, Matteelli A, Abubakar I, Aziz MA, Baddeley A, Barreira D, et al. Management of latent *Mycobacterium tuberculosis* infection: WHO guidelines for high-income and upper-income countries with low tuberculosis incidence. *Lancet Infect Dis*. 2015;15(11):1319-34.
6. Naidoo K, Yende-Zuma N, Padayatchi N, Jithoo N, Nair G, Naidoo K, et al. The impact of concurrent tuberculosis and HIV antiretroviral therapy on tuberculosis treatment outcomes in South Africa: a retrospective cohort study. *Lancet HIV*. 2017;4(11):e503-11.
7. Sharma SK, Mohanan S, Kadiravan T. TB-HIV collaborative activities in India: achievements and challenges. *Indian J Med Res*. 2018;148(6):715-24.
8. Takarinda KC, Harries AD, Nyathi B, Ngwenya M, Mutasa-Apollo T, Sandy C. Integration of HIV and tuberculosis services

- in sub-Saharan Africa. *Int J Tuberc Lung Dis*. 2017;21(4):420-8.
9. Public Health England. *Tuberculosis in England: 2022 report (presenting data to end of 2021)*. London: Public Health England; 2022.
 10. Centers for Disease Control and Prevention. *Tuberculosis and HIV coinfection surveillance report*. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention; 2022.
 11. Gupta RK, Lipman M, Fletcher HA, Noursadeghi M, Abubakar I, Zumla A. Prevention of tuberculosis in people living with HIV. *Clin Infect Dis*. 2020;71(9):e515-23.
 12. Uyei J, Coetzee D, Macinko J, Guttmacher S. Integrated TB-HIV services and TB treatment outcomes in South Africa: a longitudinal study. *BMC Infect Dis*. 2018;18(1):321.
 13. Stop TB Partnership. *TB-HIV strategic framework 2023-2030*. Geneva: Stop TB Partnership; 2023.
 14. National TB Control Program Pakistan. *National guidelines for the management of tuberculosis*. Islamabad: Ministry of National Health Services, Regulations and Coordination; 2023.
 15. Pakistan AIDS Control Program. *Integrated biological behavioral surveillance (IBBS) report*. Islamabad: Ministry of National Health Services, Regulations and Coordination; 2024.
 16. United Nations Development Programme Pakistan. *HIV epidemiological update and response in Pakistan*. Islamabad: United Nations Development Programme Pakistan; 2023.
 17. Uyei J, Coetzee D, Macinko J, Guttmacher S. Integrated TB-HIV services and TB treatment outcomes in South Africa: a longitudinal study. *BMC Infect Dis*. 2018;18(1):321.
 18. Stop TB Partnership. *TB-HIV strategic framework 2023-2030*. Geneva: Stop TB Partnership; 2023.
 19. National TB Control Program Pakistan. *National guidelines for the management of tuberculosis*. Islamabad: Ministry of National Health Services, Regulations and Coordination; 2023.
 20. Pakistan AIDS Control Program. *Integrated biological behavioral surveillance (IBBS) report*. Islamabad: Ministry of National Health Services, Regulations and Coordination; 2024.
 21. United Nations Development Programme Pakistan. *HIV epidemiological update and response in Pakistan*. Islamabad: United Nations Development Programme Pakistan; 2023.