Afghan Medical Journal

Afghan Medical Journal. 2026; 3(1):14–21. E-ISSN: 3007-0805

Barriers to tuberculosis control in five high-burden provinces of Afghanistan: A Cross-Sectional Study

Oktam Bobokhojaev[1], Mohammad Yusuf Yadgari.[2], Ahmad Wali Atayee[2], Mohammad Fahim Sarwary[2], Mohammad Ibrahim Kamal[2], Zahra Sheikhaleslami[3], Mahbobullah Sediqi[4], Maiwand Marofi[4]

[1] Department of Phthisiopulmonology, Avicenna Tajik State Medical University, Republic of Tajikistan
[2,4] Kabul University of Medical Sciences (Abu Ali Ibn Sina), Kabul, Afghanistan
[3] Tabriz University, Tabriz, Iran

Corresponding Author: Yadgari @gmail.com

ABSTRACT

Background: Tuberculosis (TB) remains a common health problem in Afghanistan despite continued implementation of the WHO End TB Strategy. This study identifies specific barriers that currentlyuu limit the TB Control Program in Afghanistan and provides evidence to inform priority actions for timely anti-tuberculosis care.

Methods: A multi-center quantitative cross-sectional survey was conducted from November to December 2025 among 200 adult TB patients and 25 healthcare providers in five purposively selected high-burden provinces (Khost, Nangarhar, Nimroz, Zabul, and Helmand). A study-specific semi-structured questionnaire was administered. Data were analyzed using Epi Info version 7.2 and RStudio version 4.4.2 with descriptive statistics, Pearson's chi-square test, and Fisher's exact test. Eligible participants were adults (≥18 years) with confirmed TB; patient and physician response rates were 91.7% and 92.6%, respectively.

Results: Social stigma was the most frequent patient-reported barrier (176/200, 88%), followed by low TB literacy, weak economic status, delayed access to diagnosis and treatment, and paid medical examinations (each 144/200, 72%). Among providers, difficulty securing sustainable funding for non-governmental organizations (NGOs) was the leading barrier (19/25, 76%), followed by unstable internet connectivity affecting laboratory results (18/25, 72%). Other major provider barriers included insufficient use of chest X-ray, inadequate child-appropriate diagnostics, limited laboratory monitoring for adverse effects, and treatment-initiation delays. No statistically significant provincial differences were found for the five main patient barriers (all $p > 0.05$); for example, social stigma showed the weakest association with province ($\chi^2 = 0.66$, $p = 0.956$).

Conclusion: Persistent patient- and health-system barriers impede TB control in these high-burden provinces. Priority actions include reducing stigma, strengthening laboratory services, ensuring free TB care, and securing sustainable support for community TB programs to advance the WHO End TB Strategy, underscoring the need for coordinated investment in laboratory infrastructure and community-based support systems.

Keywords: Afghanistan; healthcare barriers; quantitative cross-sectional survey; stigma; tuberculosis.

Introduction

Tuberculosis (TB) remains a major public health challenge in Afghanistan, with an estimated incidence of 204 cases per 100,000 populations in 2023 (95% uncertainty interval: 117–400), highlighting the continued burden of TB and the need to strengthen prevention, case detection, diagnosis, and treatment services (WHO, 2024). Decades of armed conflict have eroded the country's health infrastructure, including services for TB prevention, detection, and treatment (Bobokhojaev & Yadgory, 2024; Bobokhojaev & Muhammadyusufi, 2024). The WHO End TB Strategy aims to end the global tuberculosis epidemic by reducing TB deaths and incidence and eliminating the catastrophic costs faced by affected households. Achieving these targets requires strengthening prevention, early case detection, timely diagnosis, and effective treatment, while addressing the health-system and socioeconomic barriers that impede access to TB services (WHO, 2015). The published literature also points to specific vulnerabilities in TB control among high-risk groups. TB prevalence appears elevated among people with mental illness, refugees and migrants, and populations living in conflict-affected settings or without stable housing (Sanauddin et al., 2025; Qader et al., 2019).

Afghanistan additionally shows an atypical epidemiological pattern in which TB notification rates among women exceed those among men, a pattern attributed to social isolation, malnutrition, restricted access to health services, and mobility barriers rooted in social and gender norms (Ezadi et al., 2021; Cousins, 2021). Even where standard treatment protocols exist, access to care remains unevenly distributed. Many patients live far from health facilities or cannot afford transport costs, and these difficulties fall disproportionately on women, low-income households, refugees, and internally displaced persons (Sanauddin et al., 2025; Bariz et al., 2025). Children have likewise been identified as a vulnerable group alongside women. Available evidence emphasizes the importance of active contact screening, preventive therapy for children under five years of age, and expanded access to shorter oral treatment regimens for this age group (Sanaie et al., 2016). Active case-finding initiatives, including the TB REACH project and partnerships with international non-governmental organizations, have expanded rapidly in Afghanistan in recent years. Involving household contacts, particularly children under five, in these efforts is considered important, yet coverage of contact screening remains limited (Sanaie et al., 2016).

Certain populations may face a particularly high burden of tuberculosis or additional barriers to TB care in Afghanistan. In particular, a cross-sectional study among patients with mental illness

in Afghanistan found a substantially elevated prevalence of TB and recommended integrating TB screening and care with mental-health services (Qader et al., 2019). TB control in Afghanistan is further complicated by HIV coinfection, which can influence TB risk, clinical presentation, and treatment outcomes (Sossen et al., 2025).

Overall, TB control in Afghanistan faces interconnected patient, community, and health-system barriers, including limited healthcare access, diagnostic delays, stigma, and inadequate health-system capacity. However, evidence on these barriers across different regions remains limited. Therefore, this study assessed patient, healthcare, and system-level barriers to TB control across five provinces of Afghanistan to identify priority actions for strengthening the national TB response.

Materials and Methods

This multi-center study was a quantitative cross-sectional survey conducted to assess patient, provider, and health system-level barriers to tuberculosis control across five high-burden provinces in Afghanistan. A study-specific semi-structured questionnaire was developed by the research team in 2025. Its development was informed by the WHO Handbook for Conducting Assessments of Barriers to Effective Coverage with Health Services, the objectives of the WHO End TB Strategy, and relevant published literature on barriers to TB prevention, diagnosis, treatment, and care. The draft questionnaires were reviewed for content relevance and clarity by the study's co-authors — including Dr. M.Y. Yadgari (Kabul University of Medical Sciences) and other co-authors with clinical and public health expertise — prior to data collection. The instruments did not undergo a separate, formal pilot-testing phase with a non-study population; the questionnaires were administered directly to participants by the research team in Dari or Pashto according to participant preference, without a documented formal translation and back-translation procedure. These represent limitations of the instrument development process and are noted accordingly. The questionnaire was administered using a standardized study-specific format. It was not formally psychometrically validated; therefore, the reported barriers should be interpreted as descriptive, self-reported participant perceptions rather than scores from a validated measurement scale. Hence, the questionnaire was not directly adopted from or reproduced from the WHO handbook. Two separate questionnaires were developed, one for healthcare providers and another for people with TB, covering, in addition to educational level and work experience: training in TB management; mental health; adverse effects; gender issues; support and availability of supplies and medicines; difficulties encountered; quality and timeliness of laboratory test results or drug shortages; patient non-adherence to medical recommendations; loss to follow-up and methods for returning patients to care; proposed improvements to community-level health service delivery; delays in sputum transfer between district, regional, and central laboratory levels; road difficulties; equipment failure; distance to health clinics and absence of local centers; unstable internet connectivity; medical staff awareness of timely receipt of laboratory results; use of chest X-ray at the community level; laboratory quality control; use of new drug-resistant TB (DR-TB) treatment regimens; treatment monitoring; social support for patients; stigma and discrimination against persons with TB; instances of paid medical examinations; cooperation between persons with TB and social services; maintenance of medical confidentiality in primary healthcare institutions; and attention to key and vulnerable population groups.Before the survey, an informed consent form was prepared, and written consent to participate was obtained from each respondent. The form described the purpose of the survey, its voluntary nature, the confidentiality of respondents' identities, and the expected duration of participation.The research protocol, together with questionnaire samples and informed consent forms, was submitted to the Biomedical Ethics Committee of the Ministry of Public Health, and permission was obtained to conduct the study. The research protocol, including survey instruments and consent forms, was reviewed and approved by the Biomedical Ethics Committee of the Ministry of Public Health of Afghanistan (approval reference: MoPH/EC/2025/114, dated October 14, 2025). Prior to participation, written informed consent was obtained from all individual survey respondents, ensuring they understood the study objectives, its voluntary nature, and their right to withdraw at any time. To safeguard confidentiality regarding sensitive survey items addressing social stigma and unauthorized paid medical examinations, all questionnaires were anonymized using unique alphanumeric identification codes.

Operational Definitions and Measurement of Barriers

To ensure measurement clarity, each barrier evaluated in this study is operationally defined as follows:

Low TB literacy: Patient-reported barrier assessed by asking respondents whether they lacked adequate knowledge of TB transmission routes, symptoms, and treatment duration; coded as 'yes' (lack of awareness) or 'no'.

Weak economic status: Patient-reported barrier evaluated by asking participants if financial hardship or low household income negatively impacted their ability to seek timely care or cover transport costs; coded as 'yes' or 'no'.

Paid medical examinations: Patient-reported barrier determining whether patients faced unauthorized out-of-pocket costs or informal fees for diagnostic and medical services that should be provided free of charge; coded as 'yes' or 'no'.

Low GeneXpert positivity rate: Provider-reported barrier evaluated by asking physicians whether the local yield of positive GeneXpert results fell below expected clinical utility thresholds; coded as 'yes' or 'no'.

Poor quality management of TB patient treatment: Provider-reported barrier assessed by asking attending clinicians whether adherence to standard monitoring and clinical management protocols was sub-optimal; coded as 'yes' or 'no'.

Insufficient cooperation between persons with TB and social services: Provider-reported barrier measuring whether formal or informal referral mechanisms linking TB patients to external nutritional, financial, or social welfare support systems were inadequate; coded as 'yes' or 'no'."

Operational definitions for the remaining patient- and physician-reported barriers, all assessed via the study-specific questionnaire and coded as 'yes' or 'no' unless otherwise indicated, are as follows:

Social stigma: Patient-reported barrier assessed by asking respondents whether they had experienced or feared negative social judgment, exclusion, or discrimination because of their TB diagnosis.

Delayed access to diagnosis and treatment: Patient-reported barrier assessed by asking respondents whether distance, transport difficulties, or facility availability delayed their diagnosis or the start of treatment.

Knowledge of TB transmission routes: Patient-reported item assessed by asking respondents whether they could correctly identify how TB is transmitted; reported descriptively and distinct from the five main ranked patient-reported barriers.

Difficulty securing sustainable funding for NGOs: Provider-reported barrier assessed by asking physicians whether non-governmental organizations supporting TB services at their facility faced funding gaps or discontinuity.

Unstable internet connectivity affecting laboratory results: Provider-reported barrier assessed by asking physicians whether unreliable internet connectivity delayed the transmission or receipt of laboratory results. Insufficient use of chest X-ray for early detection: Provider-reported barrier assessed by asking physicians whether chest radiography was underused at the community level for early identification of suspected TB cases.

Insufficient child-appropriate specimen collection: Provider-reported barrier assessed by asking physicians whether child-appropriate diagnostic methods, such as induced sputum or stool-based GeneXpert testing, were inadequately available.
Insufficient access to hematological/biochemical tests for adverse effects: Provider-reported barrier assessed by asking physicians whether laboratory tests needed to monitor treatment-related adverse effects were insufficiently accessible.
Insufficient quality of laboratory results (national level): Provider-reported barrier assessed by asking physicians whether the quality or reliability of laboratory results received from national-level facilities was inadequate.
Delay in treatment initiation due to laboratory result delays: Provider-reported barrier assessed by asking physicians whether delays in receiving laboratory results postponed the start of TB treatment.
Insufficient use of WHO-recommended new treatment regimens: Provider-reported barrier assessed by asking physicians whether newer WHO-recommended TB treatment regimens were inadequately implemented at their facility.
Unnecessary hospitalizations: Provider-reported barrier assessed by asking physicians whether TB patients were hospitalized more often than clinically necessary, for example because of limited outpatient treatment infrastructure.
Irregular operation of diagnostic laboratories: Provider-reported barrier assessed by asking physicians whether diagnostic laboratory services were inconsistently available because of supply or staffing difficulties.
Delays in obtaining laboratory results: Provider-reported barrier assessed by asking physicians whether there were delays, independent of internet connectivity, in obtaining laboratory results after specimen submission.
Interruptions in supply of diagnostic reagents: Provider-reported barrier assessed by asking physicians whether shortages of diagnostic reagents interrupted routine laboratory testing.
Insufficient government funding for diagnostic methods: Provider-reported barrier assessed by asking physicians whether government funding for diagnostic services and equipment was inadequate.
Inclusion criteria: Five provinces (Khost, Nangarhar, Nimroz, Zabul, and Helmand) were purposively selected because they are consistently identified as among the highest TB-burden provinces in Afghanistan in national TB programme surveillance data and in the WHO Global Tuberculosis Report country profile for Afghanistan (1). Because these provinces were purposively selected for their burden rather than randomly sampled, findings should be interpreted as representative of high-burden settings rather than of Afghanistan as a whole; this is discussed further as a limitation. Within each province, the provincial referral hospital located in the provincial capital was selected as the study site.
Eligible patients were adults (≥18 years) with a confirmed diagnosis of tuberculosis who were receiving care at the selected facilities during the data-collection period (November–December 2025). Eligible physicians were those actively involved in TB diagnosis or treatment at the same facilities.
A fixed quota of 40 patients and 5 physicians was set for each province to ensure equal geographic representation and feasibility within the study timeframe. Consecutive eligible patients attending the facilities were invited until the quota was reached. All eligible physicians present during the data-collection window were invited.
A total of 218 patients and 27 physicians were approached. Eighteen patients and two physicians declined participation (patient response rate 91.7%; physician response rate 92.6%). The final analyzed sample consisted of 200 patients and 25 physicians. No participants were excluded after enrolment. Participant flow by province is summarized in Table 1.

Table 1. Participant flow by province

Province (City)	Facilities	Eligible patients	Approached	Refused	Included	Eligible physicians	Approached	Refused	Included
Khost (Khost)	1	46	44	4	40	6	6	1	5
Nangarhar (Jalalabad)	1	49	46	6	40	5	5	0	5
Nimroz (Zaranj)	1	43	42	2	40	5	5	0	5
Zabul (Qalat)	1	45	43	3	40	5	5	0	5
Helmand (Lashkar Gah)	1	47	43	3	40	6	6	1	5
Total	**5**	**230**	**218**	**18**	**200**	**27**	**27**	**2**	**25**

Notes:
One main provincial TB referral facility was selected in each provincial capital.Eligible patients = adults (≥18 years) with confirmed TB attending the facility during the study period.Eligible physicians = clinicians actively involved in TB diagnosis or treatment at the facility.Patient response rate = 200/218 = 91.7%; Physician response rate = 25/27 = 92.6%.No participants were lost after enrolment or excluded from analysis.Sampling Strategy and Sample Size Rationale: To ensure equal geographic representation across all five provincial capitals and maintain study feasibility within the data collection timeframe, a pre-determined equal allocation quota strategy was used. A fixed target of 40 patients and 5 specialized physicians was pre-selected for each of the five provincial referral centers, yielding a total pre-determined sample of 200 patients and 25 physicians. This purposive, quota-based approach was chosen for feasibility and equal provincial representation rather than probability sampling, and may introduce selection bias (e.g., over- or under-representation of patients with easier facility access); this trade-off, and its implications for generalizability beyond the five surveyed provinces, is discussed further in the Limitations. The patient sample size was calculated using the standard formula for estimating a single proportion, $n = Z^2p(1-p)/e^2$, with $Z = 1.96$ (95% confidence level), an assumed proportion $p = 0.5$ (maximizing required sample size in the absence of prior local estimates), and a desired margin of error $e = 0.069$, yielding a minimum required sample of approximately 202 patients; the pre-determined quota of 200 patients (40 per province) closely approximates this target and provides sufficient precision to estimate major barrier frequencies with a margin of error within 6.9 percentage points at a 95% confidence level. For healthcare providers, enrolling 5 key clinical focal points per facility (yielding n = 25) was a purposive, feasibility-based rather than formally power-calculated sample, intended to capture the primary medical decision-makers directly managing public anti-tuberculosis care in these central provincial hospitals. Because each physician represents 4.0% of the provider sample, provider results are interpreted as descriptive system insights, and percentages derived from this small subsample (n = 25) should be interpreted with caution given their limited statistical precision.
A total of 225 respondents, comprising 25 physicians and 200 patients involved in TB diagnosis and treatment, participated in the

study (Table 2).

Table 2. Number of persons surveyed by province/city

Province, City	Physicians	Patients
Khost, Khost	5	40
Nangarhar, Jalalabad	5	40
Nimroz, Zaranj	5	40
Zabul, Qalat	5	40
Helmand, Lashkar Gah	5	40
Total	**25**	**200**

All data used in this study were collected directly by the research team through the primary questionnaire-based survey described above, conducted with the permission of the relevant medical institutions, including the Ministry of Public Health, and in full compliance with ethical standards. The confidentiality and protection of personal data of both patients and physicians was guaranteed.

Statistical analyses were performed using Epi Info version 7.2 and RStudio version 4.4.2. Categorical variables were summarized as frequencies and percentages. Pearson's chi-square test was used to assess associations between province of residence and the five patient-reported barriers. Expected cell counts for the province-level chi-square comparisons were derived from the marginal totals (n = 40 patients per province; Table 1). For four of the five patient-reported barriers (low TB literacy, weak economic status, delayed access to diagnosis and treatment, and paid medical examinations), all expected cell counts exceeded 5 (expected “Yes” = 28.8, expected “No” = 11.2 per province), satisfying the assumptions of Pearson’s chi-square test. For social stigma, the expected count for the “No” response category was below 5 in every province (expected = 4.8); this comparison should therefore be interpreted with caution, and a Fisher’s exact test is recommended as a sensitivity analysis for this barrier. Because the physician sample was small (n = 25), Fisher's exact test was also used for categorical comparisons where expected cell counts were small. Statistical significance was defined as $p < 0.05$. Pearson’s chi-square test was selected as the standard, widely reported test of association between two categorical variables (barrier status and province); however, because provinces were purposively rather than randomly sampled, these tests are reported as descriptive comparisons of the observed sample rather than formal inferential tests of a population parameter, and results should be interpreted accordingly. Because five separate chi-square tests were performed across the patient-reported barriers, the possibility of Type I error from multiple testing should be considered; findings for individual barriers, particularly those with p-values closer to 0.05, are therefore interpreted cautiously and as hypothesis-generating rather than

Results

Across the two respondent groups, 21 distinct barriers were identified: five patient-reported barriers and 16 physician-reported barriers. These barriers are presented separately according to respondent group. The most frequently reported barrier was the presence of social stigma (Barrier 3; 176/200), cited by 88% of patients. This was followed by difficulties in securing sustainable funding for non-governmental organizations (Barrier 19; 19/25), cited by 19 out of 25 (76%) physicians. Four additional barriers were cited equally by 72% of respondents: low literacy levels and weak economic status among patients (Barrier 1; 144/200); delays in access to diagnostic and treatment methods (Barrier 4; 144/200); difficulty in obtaining laboratory results due to unstable internet connectivity (Barrier 7; 18/25 physicians); and difficulties in accessing medical services due to paid medical examinations (Barrier 20; 144/200).

Three barriers were cited equally by 64% of physicians: insufficient use of chest X-ray in localities for early detection of suspected TB cases (Barrier 9; 16/25); insufficient collection of diagnostic samples using child-appropriate methods, such as sputum induction and stool testing for GeneXpert (Barrier 13; 16/25); and insufficient access to hematological and biochemical tests for the diagnosis and management of adverse effects of TB treatment (Barrier 17; 16/25).

In 60% of physician responses, insufficient cooperation between persons with TB and social services was noted (Barrier 21; 15/25). In 56% of responses, insufficient quality of laboratory results at the national level was reported (Barrier 12; 14/25). Four barriers were cited equally by 52% of physicians: delay in initiating treatment due to laboratory result delays (Barrier 8; 13/25); low positivity rate of GeneXpert device effectiveness (Barrier 14; 13/25); insufficient use of WHO recommendations for new TB treatment regimens (Barrier 15; 13/25); and unnecessary hospitalizations (Barrier 18; 13/25).

Knowledge of TB transmission routes (Barrier 2; 96/200, 48%) was assessed as an additional descriptive patient-reported item and is distinct from the five main ranked patient-reported barriers presented in Table 4; it is reported here for context but was not included among the five primary barriers because it did not meet the same frequency threshold. Irregular operation of diagnostic laboratories due to supply difficulties was cited by 44% of physicians (Barrier 5; 11/25). Delays in obtaining laboratory results were also noted by 44% of physicians (Barrier 6; 11/25), as was poor quality management of TB patient treatment (Barrier 16; 11/25). The least cited barriers, mentioned by only 32% of physicians, were interruptions in the supply of diagnostic reagents (Barrier 10; 8/25) and insufficient government funding for diagnostic methods (Barrier 11; 8/25).

Collectively, these findings summarize the frequency and ranking of patient- and physician-reported barriers across the surveyed provinces; their potential implications for TB-care implementation are considered in the Discussion.

Participant Demographic and Clinical Characteristics

A total of 200 patients and 25 healthcare providers across five high-burden provinces participated in this study. Among patient respondents, the median age was 38 years (interquartile range [IQR]: 26–52), and 112 (56.0%) were female. A majority of patients (132/200, 66.0%) had no formal education, and 148 (74.0%) reported a monthly household income below the national average.

Clinically, 154 (77.0%) patients had pulmonary TB, and 172 (86.0%) had drug-susceptible TB. Among the 25 healthcare providers, 12 (48.0%) were general practitioners assigned to TB facilities, 8 (32.0%) were pulmonologists, and 5 (20.0%) were infectious disease specialists. The median professional experience in TB management among providers was 7 years (IQR: 4–12). Detailed baseline characteristics are summarized in Table 3.

Table 3. Baseline demographic and clinical characteristics of study participants

Characteristic	Patients (n = 200), n (%)	Healthcare Providers (n = 25), n (%)
Age Group (Years)		
18–34	82 (41.0)	—
35–54	74 (37.0)	—
≥ 55	44 (22.0)	—
Sex		
Female	112 (56.0)	6 (24.0)
Male	88 (44.0)	19 (76.0)
Educational Attainment		
No formal education	132 (66.0)	—
Primary / Secondary school	48 (24.0)	—
Higher education / University degree	20 (10.0)	25 (100.0)
Professional Cadre / Role		
General Practitioner (TB focal unit)	—	12 (48.0)
Pulmonologist / Chest Specialist	—	8 (32.0)
Infectious Disease Specialist	—	5 (20.0)
Years of TB Work Experience		
< 5 years	—	7 (28.0)
5–10 years	—	12 (48.0)
> 10 years	—	6 (24.0)
TB Clinical Classification		
Pulmonary TB	154 (77.0)	—
Extrapulmonary TB	46 (23.0)	—
Drug Resistance Profile		
Drug-susceptible TB	172 (86.0)	—
Confirmed Drug-resistant TB (DR-TB)	28 (14.0)	—
Treatment Phase		
Intensive phase (Months 1–2)	118 (59.0)	—
Continuation phase (Months 3+)	82 (41.0)	—

Footnotes:
Denominators for percentages are n = 200 for patients and n = 25 for providers.
Data presented as absolute frequencies (n) and percentages (%).
Based on the frequency of reported responses, five major patient-reported barriers and 16 physician-reported barriers were identified. These are presented in Tables 4 and 5.

Table 4. Patient-reported barriers to TB control (n = 200)

Barrier	Yes, n (%)	No, n (%)	95% CI for Yes (%)
Social stigma	176 (88.0)	24 (12.0)	82.7–91.9
Low TB literacy	144 (72.0)	56 (28.0)	65.3–77.9
Weak economic status	144 (72.0)	56 (28.0)	65.3–77.9
Delayed access to diagnosis and treatment	144 (72.0)	56 (28.0)	65.3–77.9
Paid medical examinations	144 (72.0)	56 (28.0)	65.3–77.9

Footnotes:
Denominator for all percentages is 200 (no missing data).
95% confidence intervals calculated using the Wilson method.
Barriers were assessed via a study-specific semi-structured questionnaire.

Table 5. Physician-reported barriers to TB control (n = 25)

Barrier	Yes, n (%)	No, n (%)	95% CI for Yes (%)
Difficulty securing sustainable funding for NGOs	19 (76.0)	6 (24.0)	56.6–88.5
Unstable internet connectivity affecting laboratory results	18 (72.0)	7 (28.0)	52.4–85.7
Insufficient use of chest X-ray for early detection	16 (64.0)	9 (36.0)	44.5–79.8
Insufficient child-appropriate specimen collection (e.g., induced sputum, stool GeneXpert)	16 (64.0)	9 (36.0)	44.5–79.8
Insufficient access to hematological/biochemical tests for adverse effects	16 (64.0)	9 (36.0)	44.5–79.8
Insufficient cooperation with social services	15 (60.0)	10 (40.0)	40.7–76.6
Insufficient quality of laboratory results (national level)	14 (56.0)	11 (44.0)	37.1–73.3
Delay in treatment initiation due to laboratory result delays	13 (52.0)	12 (48.0)	33.5–69.9
Low GeneXpert positivity rate	13 (52.0)	12 (48.0)	33.5–69.9
Insufficient use of WHO-recommended new treatment regimens	13 (52.0)	12 (48.0)	33.5–69.9
Unnecessary hospitalizations	13 (52.0)	12 (48.0)	33.5–69.9
Irregular operation of diagnostic laboratories	11 (44.0)	14 (56.0)	26.7–62.9
Delays in obtaining laboratory results	11 (44.0)	14 (56.0)	26.7–62.9
Poor quality management of TB patient treatment	11 (44.0)	14 (56.0)	26.7–62.9
Interruptions in supply of diagnostic reagents	8 (32.0)	17 (68.0)	17.2–51.6
Insufficient government funding for diagnostic methods	8 (32.0)	17 (68.0)	17.2–51.6

Footnotes:
• Denominator for all percentages is 25 (no missing data).
• 95% confidence intervals calculated using the Wilson method.

• Barriers were assessed via a study-specific semi-structured questionnaire administered to physicians involved in TB diagnosis and treatment.

The main barriers for patients were most closely associated with the presence of social stigma, low TB literacy, weak economic status, delays in access to diagnostic and treatment methods, and difficulties in accessing medical services due to paid medical examinations.

The main barriers for physicians were most closely associated with: difficulty in securing sustainable funding for NGOs; difficulty in obtaining laboratory results due to unstable internet connectivity; insufficient use of chest X-ray in localities for early detection; insufficient diagnostic sample collection using child-appropriate methods; insufficient access to hematological and biochemical tests for managing TB treatment adverse effects; insufficient cooperation between persons with TB and social services; insufficient quality of laboratory results at the national level; delays in prescribing treatment due to laboratory result delays; low GeneXpert positivity rate; insufficient use of WHO recommendations for new TB treatment regimens; unnecessary hospitalizations; irregular operation of diagnostic laboratories; delays in obtaining laboratory results; poor quality management of TB patient treatment; interruptions in the supply of diagnostic reagents; and insufficient government funding for diagnostic methods.

To assess whether the five patient-reported barriers varied by geographic location, chi-square tests of association were performed between each barrier and province of residence, using the provincial cross-tabulations in Table 6. No statistically significant differences were observed for stigma ($\chi^2 = 0.66$, df = 4, p = 0.956), low TB literacy ($\chi^2 = 1.84$, df = 4, p = 0.766), weak economic status ($\chi^2 = 4.07$, df = 4, p = 0.397), delayed access to care ($\chi^2 = 0.84$, df = 4, p = 0.933), or paid medical examinations ($\chi^2 = 2.33$, df = 4, p = 0.675) (Table 7).**Table 6. Cross-tabulation of patient-reported barriers by province (n = 200)**

Barrier	Resp.	Khost (n=40)	Nangarhar (n=40)	Nimroz (n=40)	Zabul (n=40)	Helmand (n=40)	Total n (%)
Social stigma	Yes	36	35	34	36	35	176 (88.0 %)
	No	4	5	6	4	5	24 (12.0 %)
Low TB literacy	Yes	30	28	31	26	29	144 (72.0 %)
	No	10	12	9	14	11	56 (28.0 %)
Weak economic status	Yes	31	27	32	25	29	144 (72.0 %)
	No	9	13	8	15	11	56 (28.0 %)
Delayed access to care	Yes	29	30	28	27	30	144 (72.0 %)
	No	11	10	12	13	10	56 (28.0 %)
Paid medical examinations	Yes	30	26	31	27	30	144 (72.0 %)
	No	10	14	9	13	10	56 (28.0 %)

Footnotes:

Denominator for each provincial center is n = 40; total sample N = 200.Expected cell count for Social Stigma ('No' group) = 4.8 per province; Fisher's exact test sensitivity check yielded p = 0.962.

Table 7. Association between patient-reported barriers and province of residence (n = 200)

Patient-Reported Barrier	χ^2	df	p-value	Statistical Test Used
Social stigma	0.66	4	0.956	Pearson's χ^2 (Fisher's exact p = 0.962)
Low TB literacy	1.84	4	0.766	Pearson's χ^2
Weak economic status	4.07	4	0.397	Pearson's χ^2
Delayed access to care	0.84	4	0.933	Pearson's χ^2
Paid medical examinations	2.33	4	0.675	Pearson's χ^2

Footnotes:

• Pearson's chi-square test; statistical significance defined as $p < 0.05$.

• Non-significant p-values reflect a lack of statistically significant geographic variance across the five purposively sampled provincial centers, but should not be interpreted as definitive proof of national population homogeneity.

No statistically significant associations were observed between province and the five patient-reported barriers in this sample. However, these findings should not be interpreted as evidence of national homogeneity because the provinces were purposively selected and the study was not based on probability sampling.

Discussion

This study identified a broad set of patient, healthcare, and health-system-level barriers affecting TB control implementation across five high-burden provinces of Afghanistan. Among patients, social stigma was the most frequently reported barrier (88%), followed by low TB literacy, weak economic status, delayed access to diagnosis and treatment, and payment for medical examinations (each 72%). Healthcare workers identified additional system-level constraints, particularly difficulty securing sustainable funding for non-governmental organizations (76%), unstable internet connectivity affecting laboratory-result transmission (72%), and limitations in chest radiography, child-appropriate specimen collection, and laboratory monitoring (64% each). These findings indicate that barriers are multidimensional, encompassing financial, diagnostic, infrastructural, and programmatic constraints alongside patient-level factors. The overlap between patient- and provider-reported barriers highlights the need for interventions addressing both community and health-system determinants of TB diagnosis and treatment.

The high frequency of stigma is consistent with findings from Southern Afghanistan, where TB-related stigma has been documented among patients attending multiple treatment centers and linked to delayed care-seeking and poorer treatment outcomes [15].

The present results suggest stigma is a prominent obstacle across the surveyed provinces and is linked, in respondents' accounts, to concerns about social exclusion, marriage prospects, and

employment. Community-based stigma-reduction approaches—such as involving recovered patients as peer educators or engaging religious and community leaders—may warrant consideration, although their effectiveness was not evaluated here.

Low TB literacy and weak economic status were each reported by 72% of patients, mirroring findings from other Afghan settings.

Surveys of outpatients in Urozgan and respondents in Balkh documented considerable gaps in knowledge of TB transmission, symptoms, and treatment duration [16,17]. Comparable gaps have been reported outside conflict settings, for example among elderly populations in Shenzhen, China [18]. Concurrent reporting of economic hardship aligns with the broader literature on social determinants of TB; this study was not designed to test causal pathways, so these relationships remain interpretive.

The finding that 72% of patients reported delays in accessing diagnostic and treatment services, and an equal proportion reported paying for examinations that should be free under national policy, points to weaknesses in service availability and affordability. Diagnostic delay has previously been documented in Kandahar province, where transportation difficulties, distance to facilities, and low awareness were key predictors [12]. Informal charges represent a departure from the financial-protection elements of the WHO End TB Strategy and may reflect the same resource shortages reported by physicians.

From the physician perspective, the most pressing barrier was difficulty securing sustainable funding for non-governmental organizations (76%), followed by unreliable internet connectivity hindering laboratory-result transmission (72%). These findings align with the donor-dependency and infrastructure limitations described in Afghanistan's national TB roadmap [13] and with WHO's characterization of the country's TB response as heavily reliant on external financing [1]. The combination of funding uncertainty—particularly after reductions in international assistance after 2021—and chronic connectivity and laboratory-capacity constraints suggests that improving diagnostic turnaround will require attention to both laboratory capacity and the financing of peripheral testing networks.

Physicians also reported limited use of chest radiography for early case detection, insufficient child-appropriate specimen-collection methods (such as induced sputum and stool-based GeneXpert testing), and inadequate laboratory monitoring for treatment-related adverse effects, each cited by 64%. These gaps are consequential for pediatric and drug-resistant TB care, which depend on adapted diagnostic pathways rather than standard adult protocols [11]. Prior reports of elevated TB burden among people with mental illness and refugee populations [5,8] suggest that the barriers identified here—stigma, cost, and diagnostic delay—may be more pronounced in subgroups not specifically targeted by this survey, including psychiatric patients, refugees, and people living with HIV [14].

The atypical gender pattern previously documented in Afghanistan, in which TB notification rates among women exceed those among men [9,10], was not assessed because respondents were not stratified by sex. Several reported barriers—stigma, economic hardship, and restricted access to facilities—could plausibly affect women differently, but the present data do not allow assessment of sex-specific differences. Future research that disaggregates barrier data by gender would help clarify whether the relative weight of each barrier differs between male and female patients.

In summary, the most frequently reported barriers are stigma, limited TB literacy, economic constraints, diagnostic and treatment delays, out-of-pocket payments, NGO funding instability, internet connectivity problems, and gaps in radiographic, pediatric, and laboratory monitoring capacity. Interventions addressing these measured constraints—while recognizing the study's limited scope regarding unexamined subgroups—offer a practical basis for strengthening TB control in the surveyed high-burden provinces.

Conclusions

This study identified important patient, healthcare, and system-level barriers to effective tuberculosis (TB) control in Afghanistan. Among patients, the major barriers included social stigma, low TB literacy, poor economic status, delays in accessing diagnosis and treatment, and paid medical examinations. Healthcare providers also reported important system-level challenges, including difficulties obtaining laboratory results, inadequate use of chest X-ray, limited child-appropriate diagnostic methods, insufficient access to laboratory investigations, and unpredictable funding for community-level TB services. Additional barriers included delays in sputum transportation, equipment and reagent shortages, inadequate laboratory consumables, unstable internet connectivity, insufficient implementation of recommended TB treatment regimens, and limited social and nutritional support.

Although the frequency of these barriers did not differ significantly across the five provinces, their consistent occurrence indicates that they represent broader challenges within the TB control system rather than isolated provincial problems. Addressing these challenges requires coordinated national-level action, with priorities including strengthening community-based TB services, improving diagnostic and laboratory capacity, reducing delays in specimen transportation and reporting, ensuring free access to TB diagnostic services, strengthening support for vulnerable populations, and securing predictable funding for community-level TB programs. Further longitudinal studies and sex-disaggregated analyses are warranted to determine how these barriers influence treatment outcomes and to inform future TB control strategies in Afghanistan.

Limitations

Several limitations should be considered when interpreting these findings. First, the study design is cross-sectional design, which allows barriers to be identified and ranked but does not permit causal inference about how these barriers interact with treatment outcomes over time. Second, the physician subsample (n = 25) was substantially smaller than the patient subsample (n = 200), producing an imbalance that limits the statistical power of direct comparisons between the two groups. Third, the study was restricted to five provinces selected specifically for their high TB burden (Khost, Nangarhar, Nimroz, Zabul, and Helmand); findings may not generalize to provinces with different security conditions, urbanization levels, or health-system capacity. Fourth, data were collected using a purpose-built questionnaire that has not undergone formal psychometric validation, and self-reported items, particularly those concerning stigma and informal payments, may be subject to social desirability or recall bias. Fifth, translation between Dari/Pashto and English during data collection and reporting may have introduced minor semantic variation. Sixth, because respondents were not stratified by sex, age, HIV status, or disability, the study could not examine whether the documented barriers disproportionately affect women, children, or other vulnerable subgroups previously identified in the literature. Finally, while this study captured quantitative survey metrics, it did not include a formal qualitative thematic analysis; future mixed-methods studies incorporating coded participant narratives are recommended to contextualize these findings.

Acknowledgments The authors sincerely thank all those who collaborated and contributed to the preparation of this article.

Acknowledgments The authors sincerely thank all those who collaborated and contributed to the preparation of this article.

Conflicting interestThe authors declare that they have no conflicting interest.

Funding No grants were received from public, commercial, or non-profit funding agencies.

reported important system-level challenges, including difficulties obtaining laboratory results, inadequate use of chest X-ray, limited child-appropriate diagnostic methods, insufficient access to

laboratory investigations, and unpredictable funding for community-level TB services. Additional barriers included delays in sputum transportation, equipment and reagent shortages, inadequate laboratory consumables, unstable internet connectivity, insufficient implementation of recommended TB treatment regimens, and limited social and nutritional support.

Although the frequency of these barriers did not differ significantly across the five provinces, their consistent occurrence indicates that they represent broader challenges within the TB control system rather than isolated provincial problems. Addressing these challenges requires coordinated national-level action, with priorities including strengthening community-based TB services, improving diagnostic and laboratory capacity, reducing delays in specimen transportation and reporting, ensuring free access to TB diagnostic services, strengthening support for vulnerable populations, and securing predictable funding for community-level TB programs. Further longitudinal studies and sex-disaggregated analyses are warranted to determine how these barriers influence treatment outcomes and to inform future TB control strategies in Afghanistan.

Limitations

Several limitations should be considered when interpreting these findings. First, the study design is cross-sectional design, which allows barriers to be identified and ranked but does not permit causal inference about how these barriers interact with treatment outcomes over time. Second, the physician subsample (n = 25) was substantially smaller than the patient subsample (n = 200), producing an imbalance that limits the statistical power of direct comparisons between the two groups. Third, the study was restricted to five provinces selected specifically for their high TB burden (Khost, Nangarhar, Nimroz, Zabul, and Helmand); findings may not generalize to provinces with different security conditions, urbanization levels, or health-system capacity. Fourth, data were collected using a purpose-built questionnaire that has not undergone formal psychometric validation, and self-reported items, particularly those concerning stigma and informal payments, may be subject to social desirability or recall bias. Fifth, translation between Dari/Pashto and English during data collection and reporting may have introduced minor semantic variation. Sixth, because respondents were not stratified by sex, age, HIV status, or disability, the study could not examine whether the documented barriers disproportionately affect women, children, or other vulnerable subgroups previously identified in the literature. Finally, while this study captured quantitative survey metrics, it did not include a formal qualitative thematic analysis; future mixed-methods studies incorporating coded participant narratives are recommended to contextualize these findings.

Acknowledgments

The authors sincerely thank all those who collaborated and contributed to the preparation of this article.

Acknowledgments

The authors sincerely thank all those who collaborated and contributed to the preparation of this article.

Conflicting interest

The authors declare that they have no conflicting interest.

Funding

No grants were received from public, commercial, or non-profit funding agencies.

References

1. World Health Organization. Tuberculosis epidemiological profile — Afghanistan. WHO data dashboard. Geneva: World Health Organization; 2024. Available from: https://worldhealthorg.shinyapps.io/tb_profiles/
2. Bobokhojaev OI, Yadgory MY. Epidemiological situation of tuberculosis in the Islamic Republic of Afghanistan in the last six years. Avji Zuhal. 2024;4(57):82-87.
3. Bobokhojaev OI, Muhammadyusufi Y. Pattern of situation of tuberculosis in the Islamic Republic of Afghanistan. Hosp Palliat Med Int J.2024;7(4):118-121. doi:10.15406/hpmij.2024.07.00254.
4. World Health Organization. The End TB Strategy. Geneva: World Health Organization; 2015.
5. Sanauddin N, Ahmad F, Rahim M, Paracha MA, Khan Z, Qazi FK, et al. Barriers to treatment adherence among patients with tuberculosis: a qualitative study of Pakistani nationals and Afghan refugees. BMJ Open. 2025;15(10):e100882. doi:10.1136/bmjopen-2025-100882.
6. Bobokhojaev OI. Long-term results of 10 years of observation of cured cases of pulmonary tuberculosis. J Pulmonol Respir Res. 2022;6:007-011.
7. Crisan-Dabija R, Grigorescu C, Pavelescu LA, et al. Tuberculosis and COVID-19: Lessons from the past viral outbreaks and possible future outcomes. Can Respir J. 2020;2020:1401053. doi:10.1155/2020/1401053.
8. Qader GQ, Seddiq MK, Rashidi KM, Hamim A, Akhgar MH, Ahmad B, et al. Prevalence of tuberculosis among mentally ill patients in conflict-stricken Afghanistan: A cross-sectional study. Int J Infect Dis. 2019;89:45-50. doi:10.1016/j.ijid.2019.08.020.
9. Ezadi Z, Mohammadi N, Sarwari R, Jafari SM. Afghan women and access to health care in the past 25 years. EClinicalMedicine. 2021;43:101235. doi:10.1016/j.eclinm.2021.101235.
10. Cousins S. Tuberculosis hits more men than women. But not in Afghanistan. The New Humanitarian. 2021 Feb 24. Available from: https://www.thenewhumanitarian.org/
11. Sanaie A, Mergenthaler C, Nasrat A, Seddiq MK, Mahmoodi S, Stevens RH, et al. An evaluation of passive and active approaches to improve tuberculosis notifications in Afghanistan. PLoS One. 2016;11(10):e0163813. doi:10.1371/journal.pone.0163813.
12. Bariz H, Stanikzai MH, Mudaser GM, Stanikzai KA, Dadras O. Diagnostic delay and its predictors among tuberculosis patients in Kandahar, Afghanistan: A cross-sectional analytical study. Int J Mycobacteriol. 2025;14(3):232-238. doi:10.4103/ijmy.ijmy_91_25.
13. USAID. Afghanistan tuberculosis roadmap overview, fiscal year 2023. Washington (DC): USAID; 2024.
14. Sossen B, Kubjane M, Meintjes G. Tuberculosis and HIV coinfection: Progress and challenges towards reducing incidence and mortality. Int J Infect Dis. 2025;155:107876. doi:10.1016/j.ijid.2025.107876.
15. Stanikzai MH, Rahimy N, Baray AH, Anwary Z, Ahmad M, Sayam H. High stigma prevalence and associated factors among TB patients in Southern Afghanistan: a multi-center cross-sectional study. Indian J Tuberc. 2024;71(Suppl 2):S203-S207. doi:10.1016/j.ijtb.2024.08.005.
16. Ahmadi R, Hussaini SM. Knowledge, attitude, and practices toward tuberculosis among hospital outpatients in Urozgan, Afghanistan. Salamat Academic & Research Journal. 2025;1(2):37-44. doi:10.61438/sarj.v1i2.146.
17. Masudi M, Hamidi AW, Rahimi A, Mecir NA, et al. Assessment of knowledge, attitude, and practice toward tuberculosis: A cross-sectional study in Balkh, Afghanistan. Health Sci Rep. 2025;8(10):e71338. doi:10.1002/hsr2.71338.
18. Wang Y, Gan Y, Zhang J, Mei J, et al. Analysis of the current status and associated factors of tuberculosis knowledge, attitudes, and practices among elderly people in Shenzhen: a cross-sectional study. BMC Public Health. 2021;21:1163. doi:10.1186/s12889-