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Community Knowledge, Awareness, Attitude and Care-Seeking Behaviour Related to Tuberculosis in Lahore, Punjab, Pakistan

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Abstract

Tuberculosis remains a major public health challenge in Pakistan despite available diagnostics and curative therapy. We conducted a community-based cross-sectional survey of 462 adults in Lahore, Pakistan (January to May 2023) using bilingual, venue-based and online questionnaires to assess knowledge, attitudes, and care-seeking for tuberculosis. Most respondents had heard of tuberculosis (439 of 462, 95.0 percent) and recognized at least one cardinal symptom; the most frequently identified was cough lasting more than three weeks (218, 47.2 percent). Airborne transmission via coughing or sneezing was the best-recognized route (262, 56.7 percent), although misconceptions persisted, including transmission through sharing plates (128, 27.7 percent). Knowledge of curability was high (444, 96.1 percent), and most selected specific drugs provided by health facilities as appropriate treatment (339, 73.4 percent). Intended care seeking was favorable: 351 respondents (76.0 percent) would attend a health facility for tuberculosis-like symptoms and 228 (49.4 percent) would do so as soon as they recognized symptoms. However, cost (148, 32.0 percent), uncertainty about where to go (88, 19.0 percent), and transport or distance (58, 12.6 percent) were prominent barriers; most still desired more information about tuberculosis (419, 90.7 percent). These findings indicate a high baseline of awareness in an urban setting, coupled with specific misconceptions and practical obstacles that may delay care. Targeted myth-correction, clear navigation to free or subsidized services, and measures to reduce out-of-pocket and transport barriers are likely to accelerate earlier diagnosis and treatment.

Keywords: Tuberculosis; knowledge attitudes and practices; care seeking; community survey; Lahore; Pakistan; health education; public health barriers.

1. INTRODUCTION

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis*. This organism can attack multiple organs of the human body, most commonly the lungs. Cardinal symptoms include a cough lasting more than three weeks, fever, fatigue, night sweats, and chest pain. In Pakistan, approximately 510,000 cases were estimated annually in earlier reports, placing the country among the world's highest TB burden settings (Khan, Shaikh, & Baig, 2020). In 1993, the World Health Organization (WHO) declared TB a global emergency. Historical statistics cited 1.6 million TB deaths in 2005, and 8.8 million people infected in 2017 (Ahmed, Fatmi, Ali, Ahmed, & Ara, 2009). A WHO analysis from 2011 reported 8.7 million incident cases, 1.2 million prevalent cases, and 1.4 million deaths, with most cases in Asia and Africa. TB remains a major driver of economic stress in lower income countries (Tolossa, Medhin, & Legesse, 2014). Despite decades of control efforts, TB still causes more than a million deaths each year. The WHO Global Tuberculosis Report 2024 estimates that in 2023 there were about 10.8 million incident TB cases and roughly 1.25 million deaths worldwide, with South-East Asia contributing the largest regional share. Progress toward End TB targets remains off track after COVID-19 disruptions, which underscores the need to strengthen prevention, diagnosis, and treatment coverage (WHO, 2024).

Pakistan remains a high-burden country. Current national figures reported by the National TB Control Programme indicate an incidence near 276 per 100,000 population per year, with prevalence about 348 per 100,000 and mortality about 34 per 100,000. These estimates also note Pakistan's position among the top global contributors to incident TB, emphasizing the

public health and economic impact (National TB Control Programme Pakistan, n.d.). Subnational and historical data point to heterogeneity across provinces and large cities, which supports the case for locally tailored strategies in major urban centers such as Lahore (National TB Control Programme Pakistan, n.d.).

In 1991, the World Health Assembly renewed commitments to TB control, yet TB still causes well over a million deaths annually. International studies have examined knowledge, attitudes, and practices regarding TB. In Pakistan, foundational KAP work exists, yet gaps persist in socio-economic contexts and in how knowledge translates into timely care-seeking (Mushtaq *et al.,* 2010). TB remains a major public health problem worldwide (Easwaran *et al.,* 2015). For example, global estimates for 2014 reported 9.6 million cases and 1.5 million deaths (Noé *et al.,* 2017).

Effective control is more likely when health care workers have strong TB knowledge. Adequately trained and supervised front-line staff are central to treatment services, patient support, and follow-up, and therefore to successful cure and control. Assessing the knowledge and practices of front-line workers helps identify capacity gaps and informs targeted training (Noé *et al.,* 2017). A core pillar of the End TB Strategy is to find and treat all forms of TB, increase treatment coverage, and eliminate catastrophic costs for affected households. By 2030, the strategy targets a 90 percent reduction in TB deaths and an 80 percent reduction in incidence relative to 2015. Achieving these milestones requires person-centred care, community engagement, rapid molecular diagnostics, and social protection integrated with routine services (WHO, End TB Strategy; Floyd *et al.,* 2018).

Even with major advances in diagnostics and treatment, TB remains a top global health challenge (Singh, Bala, & Goel, 2006). Health education is critical to empower patients and families, improve treatment contribution, and reduce risk. Human immunodeficiency virus co-infection, active TB in household or community contacts, and other vulnerabilities erode TB control, particularly where access barriers persist (Kigozi, Heunis, Engelbrecht, Janse van Rensburg, & van Rensburg, 2017).

Programmatically, TB control emphasizes early diagnosis and effective treatment, yet low case detection in some settings and the emergence of multidrug-resistant TB continue to challenge control efforts (Adane *et al.,* 2017). Disappointing cure rates are linked to inaccurate or delayed diagnosis, nonstandard regimens, and poor completion of therapy (Ahmed *et al.,* 2009). Raising awareness about symptoms, transmission, and access to free treatment is crucial to accelerate case finding and improve outcomes (Konda, Melo, & Giri, 2016). Diagnostic delay remains a persistent barrier. Studies in Pakistan and neighboring contexts report that stigma, transport and cost barriers, and initial misdiagnosis contribute to prolonged patient and system delays, often extending well beyond one to two months between symptom onset and treatment initiation (Amin *et al.,* 2023; Bariz *et al.,* 2025). Reducing these delays is essential to interrupt transmission and improve prognosis.

Globally, TB prevalence correlates with poverty. Numbers have fallen in many high-income countries while remaining high or rising in lower income settings. Eliminating TB requires early and accurate diagnosis, effective prevention, and complete treatment. Urban crowding, suboptimal treatment standards, and increasing drug resistance hinder control efforts. Many studies have evaluated public knowledge about TB symptoms, routes of transmission, management, treatment, and prevention. Awareness of curability is often high, but misconceptions persist. Urban populations and higher socio-economic groups tend to have better knowledge, while rural communities and lower socio-economic groups have poorer understanding. In Pakistan, multiple misconceptions have been documented among patients.

Stigma undermines screening, timely presentation, and adherence. Systematic reviews show that TB-related stigma is widespread, with well-described pathways through anticipated and enacted stigma that reduce willingness to disclose symptoms and to seek care (Courtwright & Turner, 2010). Recent syntheses also catalog interventions that can reduce stigma and improve engagement with services (Aitambayeva *et al.,* 2025). The revised national TB control program employs Directly Observed Treatment, Short-course (DOTS) to maximize cure rates above 85 percent and to increase case detection toward 70 percent. These goals require active community participation, strong management, prevention measures, and accessible services (Jangid, Agrawal, Yadav, Pandey, & Mathur, 2016). Stigma and low awareness contribute to under-utilization of services, poor adherence, and delays in diagnosis. Inadequate knowledge and misunderstanding of treatment fuel non-adherence. Greater public knowledge increases acceptance of control measures and reduces transmission (Tachfouti, Slama, Berraho, & Nejjari, 2012). Evidence across settings confirms persistent misconceptions and knowledge gaps, with variation by place and population. For example, a study of working women reported minimal knowledge and neutral attitudes toward TB (Haque *et al.,* 2018).

Taken together, these considerations justify updated community evidence from major Pakistani cities. Lahore, with its dense public and private healthcare mix, is a priority setting. The present study therefore assesses knowledge, attitudes, and practices toward TB in Lahore and examines socio-demographic correlates that can guide targeted health education and

locally adapted interventions aligned with End TB objectives (WHO, 2024).

2. METHODOLOGY

2.1. Ethical Consideration

The ethical committee of Akhtar Saeed College of Pharmaceutical Sciences, Bahria Town, Lahore, approved this research study. We obtained informed consent from each participant involved in this study before conducting the research survey. We took into account the ethics of research and ensured that there was no misleading information or deception present in this study.

2.2. Study Design

We carried out cross-sectional survey-based research from January 2023 to May 2023. The target population for this study was the General Community in Lahore. Awareness, Knowledge, Attitude, and care-seeking behaviour against TB were evaluated in different areas of Lahore.

2.3. Study population

The research included a total of 462 participants (n=462). All participants are currently living in diverse suburbs and urban areas of Lahore, Pakistan that were included in the study. Incomplete forms were eliminated while analyzing the outcomes. The research was carried out in various locations such as parks, hospitals, colleges, neighbourhoods, and roads, using both online Google forms as well as printed forms. We received 312 replies through Google Forms and distributed 150 printed handouts.

2.4. Inclusion criteria

We included individuals over the age of 18 from various age groups in this survey. We ensured that each participant was in his or her best mental state during the time of the survey and that he or she was legally registered as a citizen of Pakistan. We specifically included only those who were native to Lahore, which is located in the Punjab province.

2.5. Exclusion criteria

This survey excluded individuals who were under the age of 18, mentally retarded, and those who had certain medical conditions such as Alzheimer's, bipolar disorder, and split personality. Additionally, the survey excluded residents from cities other than Lahore.

2.6. Procedure

Participants were selected randomly from various areas like parks, malls, hospitals, colleges and universities, both private and public, who were certified Pakistani nationals. Before the survey began, the participants were fully informed about the purpose of the research and asked for their consent to take part. The questionnaires were in both English and Urdu languages for the convenience of participants. The survey forms were created in digital format through Google form and shared across several social media channels with the individuals involved in the study and the physical copies of the questionnaires were distributed to various public and private organizations. The participants had the option to complete and return the surveys on the spot or at a later time that was convenient for them. Some people declined to take part in the study due to their hectic schedules.

2.7. Sample Size

Based on the latest analysis conducted by the Punjab government, Lahore's population is estimated to be around 11million.This information has been obtained from the official website(https://www.pbs.gov.pk/sites/default/files/tables/district_at_glance/Lahore.pdf)

Raosoft Calculator® was used to choose the sample size within a 95% confidence level, 5% margin of error, and population size of 11 million, yielding a sample size of 385 participants for the study that was estimated to be representative of people currently living in Lahore. Considering a 20% dropout in mind, in order to get an optimal response ratio, a total of 462 participants, the sample size was the final number of responses required for data collection.

2.8. Questionnaire Development

Based on the review of existing literature and analysis of more than 50 publications on Awareness, Knowledge, Attitudes, and Care-seeking Behaviors, we have created a questionnaire that has been pre-tested and refined simply by using resources from the World Health Organization's official website https://apps.who.int/iris/handle/10665/43790. Initial draughts of the developed questionnaire were forwarded to the supervisor for examination and approval in order to ensure their validity, authenticity, and typography, as well as their importance and suitability. After being approved, it was given to the participants. This questionnaire consisted of 27 questions and took not more than 5 to 10 minutes to complete. We divided our survey into four sections or categories. The first section provided a brief introduction to the participant and included the survey title, research description, and study purpose. Additionally, it contained a consent form for participants to agree to before proceeding. The second part of the survey evaluated the socio-demographic characteristics of the participants with eight questions. On the other hand, the third section aimed to gauge the knowledge and awareness of the respondents about Tuberculosis, consisting of twelve questions, the fourth section, consisting of seven questions, was intended to evaluate the participants' approach and level of concern towards tuberculosis. Wherever necessary we investigated participant acceptance rates for various things using a Likert Scale (very serious, somewhat serious, not very serious) OR (Yes, No) OR (Low, Moderate, High).

2.9. Method of Data Collection

A Google form was made to conduct research, and 150 printed copies were produced. The questionnaire was initially created in English language, later it was translated into Urdu by the qualified professor of Urdu linguistics. The survey was distributed to the selected study group, which consisted of Lahore's residents, through various means in March 2023. This included utilizing social media platforms and visiting different areas within Lahore. Random individuals from both public and private sectors and organizations in Lahore were invited to participate in the study. The online form was sent to individuals via various social media platforms available or most convenient to use for the respondent. And physical copies, once we had introduced the purpose and topic of our research and obtained consent from the participant, we proceeded with the questionnaire. We began by restating the questions in our own words to ensure they were clearly understood. The handouts were gathered immediately on the spot. Some individuals declined to take part due to their hectic routines and lack of interest in research. Participants were informed of the research study's aim, title, purpose, and objective. Their permission to participate was taken once they received the questionnaire. The study questions were expressed in clear, straightforward, and well-defined language for easier understanding and comprehension.

Statistical Analysis Tools

Data analysis was accompanied using Statistical tools. Statistical Package for Social Sciences (IBM SPSS, version 26.0**)**, has been used for analysis of the collected data. Then descriptive statistics were applied for the calculation of frequencies and percentages.

3. RESULTS

3.1. Sociodemographic profile

Table 1 summarizes respondent characteristics (n = 462). The modal age group was 18–27 years (295, 63.9%), followed by 28–45 years (61, 13.2%), 45–65 years (60, 13.0%), and 65 years or older (46, 10.0%). Females comprised 60.6% (280 of 462). Most participants were single (286, 61.9%) and reported secondary to higher education (410, 88.7%). Two thirds were unemployed at the time of survey (313, 67.7%). A large majority resided in urban areas (367, 79.4%). Self-reported economic status was predominantly middle class (348, 75.3%), with smaller proportions reporting low (67, 14.5%) or high (46, 10.0%) status; one response was missing on this item (noted in the table). Punjabi ethnicity predominated (433, 93.7%), with smaller shares of Pashtun (2.4%), Sindhi (1.9%), and Baloch (1.9%).

Table 1: Sociodemographic characteristics of participants in Lahore Punjab, Pakistan

Characteristic	Frequency (N)	Percentage (%)
Age		
18- 27 years	295	63.9
28-45 years	61	13.2
45-65 years	60	13.0
65 above	46	10.0
Gender		
Male	182	39.4
Female	280	60.6
Marital status		
Married	149	32.3
Single	286	61.9
Widow	17	3.7
Separated/Divorced	10	2.2
Educational status		
No education to primary	52	11.3
Secondary to Higher education	410	88.7
Occupational status		
Employed	95	20.6
Unemployed	313	67.7
Retired	54	11.7
Economic status		
High	46	10.0
Medium	348	75.3
Low	67	14.5
Area of Residence		
Urban	367	79.4
Rural	95	20.6

Characteristic	Frequency (N)	Percentage (%)
Ethnicity		
Punjabi	433	93.7
Pashtun	11	2.4
Sindhi	9	1.9
Baloch	9	1.9

3.2. Knowledge and awareness

Nearly all respondents had heard of TB (439, 95.0%). The most frequently reported sources of initial information were family, friends, neighbors, and colleagues (161 responses, 34.8% of respondents), teachers (133, 28.8%), and newspapers or magazines (103, 22.3%). Smaller proportions cited health workers (94, 20.3%), television (57, 12.3%), brochures or other printed material (32, 6.9%), radio (11, 2.4%), and religious leaders (7, 1.5%). These items allowed multiple responses (Table 2).

Perceived severity was high. More than half considered TB a very serious disease (248, 53.7%), with a further 44.2% rating it somewhat serious. When asked about the seriousness of TB in their country or region, 42.2% selected very serious and 54.1% somewhat serious.

Recognition of key clinical features was common. The most frequently identified symptom was a cough lasting longer than 3 weeks (218, 47.2%). Other commonly selected features included chest pain (154, 33.3%), coughing up blood (111, 24.0%), weight loss (125, 27.0%), fever without a clear cause for more than 7 days (101, 21.9%), shortness of breath (102, 22.1%), ongoing fatigue (84, 18.2%), and fever (96, 20.8%). Rash (27, 5.8%) and nausea (51, 11.0%) were less often selected. Multiple responses were permitted.

Regarding transmission, the most frequent response was through air when a person with TB coughs or sneezes (262, 56.7%). Misconceptions persisted, including transmission through sharing the same plate (128, 27.7%), sharing dishes (85, 18.4%), handshakes (57, 12.3%), and touching items in public places (78, 16.9%). For prevention, covering mouth and nose when coughing or sneezing was the most common response (256, 55.4%), followed by washing hands after touching items in public places (169, 36.6%) and avoiding sharing dishes (102, 22.1%); 15.4% selected praying. Most respondents understood that anybody can be infected (381, 82.5%), although smaller groups endorsed restricted risk groups such as only poor people (7.4%) or only people with HIV (7.8%).

Curability knowledge was high. Most respondents stated that TB can be cured (444, 96.1%). Specific drugs given by a health center were cited by 339 respondents (73.4%), DOTS by 50 (10.8%), with smaller proportions selecting herbal remedies (53, 11.5%), praying (51, 11.0%), or home rest without medicine (36, 7.8%). About two thirds felt well informed about TB (300, 64.9%), yet a large majority still wished for more information (419, 90.7%),

Table 2: Community's knowledge and awareness about signs and symptoms, mode of transmission, prevention and treatment of TB in Lahore Punjab, Pakistan

Characteristics	Frequency (N)	Percentage (%)
Have you heard about TB		
Yes	439	95.0
No	23	5.0
Where did you first learn about TB		
newspapers and magazines	103	22.3
Radio	9.1	9.1
TV	57	12.3
Billboards	11	2.4
Brochures, posters and other printed material	32	6.9
Health workers	94	20.3
Family, Friends, Neighbors and Colleagues	161	34.8
Religious leaders	7	1.5
Teachers	133	28.8
Other	23	5.0
In your opinion, how serious a disease is TB		
Very Serious	248	53.7
Somewhat serious	204	44.2
Not very serious	10	2.2

Characteristics	Frequency (N)	Percentage (%)
How serious a problem do you think TB is in your country/region		
very serious	195	42.2
somewhat serious	250	54.1
not very serious	17	3.7
What are the signs and symptoms of TB		
Rash	27	5.8
Cough	170	36.8
Cough that lasts longer than 3 weeks	218	47.2
Coughing up blood	111	24.0
Severe headache	54	11.7
Nausea	51	11
Weight loss	125	27
Fever	96	20.8
Fever without clear cause that lasts more than 7 days	101	21.9
Chest pain	154	33.3
Shortness of breath	102	22.1
Ongoing fatigue	84	18.2
Do not know	33	7.1
Other	29	6.3
How can a person get TB		
through handshakes	57	12.3
through air when person with tb coughs or sneezes	262	56.7
through sharing dishes		18.4
through sharing same plate	128	27.7
through touching items in public places	78	16.9
do not know	33	7.1
other	27	5.8
How can a person prevent getting TB		
avoid shaking hands	55	11.9
covering mouth and nose when coughing and sneezing	256	55.4
avoid sharing dishes	102	22.1
Washing hands after touching items in public places	169	36.6
closing windows at home	30	6.5
by praying	71	15.4
do not know	31	6.7
Who can be infected with TB		
Anybody	381	82.5
Only poor people	34	7.4
Only homeless people	26	5.6
Only alcoholics	17	3.7
Only drug users	19	4.1
Only people with HIV/AIDS	36	7.8
Only people who have been in prison	16	3.5
Others	24	5.2
Can TB be cured		
Yes	444	96.1
No	18	3.9
How can someone, with TB be cured?		
Herbal remedies	53	11.5
Home rest without medicine	36	7.8
Praying	51	11.0
Specific drugs given by health center	339	73.4
DOTS	50	10.8
Do not know	47	10.2
Other	12	2.6

Characteristics	Frequency (N)	Percentage (%)
Do you feel well-informed about TB		
Yes	300	64.9
No	162	35.1
Do you wish you could get more information about TB		
Yes	419	90.7
No	43	9.3

3.3. Attitudes and care-seeking behavior

Perceived susceptibility was moderate to high. Two thirds believed they could get TB (302, 65.4%). If diagnosed, the most common anticipated reaction was fear (242, 52.4%), followed by surprise (160, 32.6%) and sadness or hopelessness (56, 12.1%); feelings of shame (5.8%) or embarrassment (3.5%) were less frequent.

Respondents indicated that they would primarily speak to a doctor or another medical worker about their illness (314, 68.0%), with additional disclosures to parents (145, 31.4%), spouses (82, 17.7%), close friends (54, 11.7%), or other family members (39, 8.4%). Only 1.1% indicated that they would speak to no one. Multiple responses were permitted.

Intended care-seeking for TB-like symptoms prioritized formal care. Most said they would go to a health facility (351, 76.0%). Smaller proportions would go to a pharmacy (74, 16.0%), consult a traditional healer (32, 6.9%), or pursue other self-treatment options such as herbs (33, 7.1%). Regarding timing, 49.4% would go as soon as they realized their symptoms might be related to TB, 35.7% would go when symptoms lasted more than 3–4 weeks, and 13.6% would go after their own treatment failed; 1.3% stated they would not go to a doctor.

Participants endorsed several reasons that could deter health facility attendance. Cost was the most frequently selected barrier (148, 32.0%), followed by not being sure where to go (88, 19.0%), transport or distance (58, 12.6%), not liking or not trusting medical workers (42, 9.1% and 38, 8.2%, respectively), inability to leave work (38, 8.2%), and not wanting to find out that something is really wrong (55, 11.1%). Multiple responses were permitted. Perceived affordability of TB services varied: 49.6% rated diagnosis and treatment as reasonably priced, 33.8% as somewhat or moderately expensive, 8.4% as very expensive, and 8.2% believed it is free of charge.

Table 3: Community's attitude, practice and care-seeking behaviour related to Tuberculosis in Lahore Punjab, Pakistan

Characteristic	Frequency (N)	Percentage (%)
Do you think you can get TB?		
YES	302	65.4
NO	160	34.6
What would be your reaction if you were found out that you have TB?		
Fear	242	52.4
Surprise	160	32.6
Shame	27	5.8
Embarrassment	16	3.5
Sadness or hopelessness	56	12.1
Other	94	20.3
Who would you talk to about your illness if you had TB?		
Doctor or another medical worker	314	68.0
Spouse	82	17.7
Parent	145	31.4
Child(ren)	28	6.1
Other family member	39	8.4
Close friend	54	11.7
No one	5	1.1
Other	36	7.8
What would you do if you thought you had symptoms of TB		
Go to health facility	351	76.0
Go to pharmacy	74	16.0
Got to traditional healer	32	6.9
Pursue other self-treatment options (herbs, etc.)	33	7.1
Other	17	3.7

Characteristic	Frequency (N)	Percentage (%)
If you had symptoms of TB, at what point would you go to the health facility?		
when treatment of my own does not work	63	13.6
when symptoms that look like tb lasts more than 3-4 weeks	165	35.7
as soon as i realize that my symtoms might be related to tb	228	49.4
i would not go to the doctor	6	1.3
If you would not go to the health facility, what is the reason?		
Not sure where to go	88	19.0
Cost	148	32.0
Difficulties with transportation/distance to clinic	58	12.6
Do not trust medical workers	38	8.2
Do not like attitude of medical workers	42	9.1
Cannot leave work (overlapping work hours with medical facility working hours)	38	8.2
Do not want to find out that something is really wrong	55	11.1
Other	112	24.2
How expensive do you think TB diagnosis and treatment is in this country?		
It is free of charge	38	8.2
It is reasonably priced	229	49.6
It is somewhat/moderately expensive	156	33.8
It is very expensive	39	8.4

4. DISCUSSION

4.1. Principal findings

This community survey from Lahore found high awareness of tuberculosis. Most respondents had heard of TB (95.0 percent) and recognized at least one cardinal symptom. A cough lasting more than three weeks was the most frequently identified symptom (47.2 percent), followed by chest pain, coughing blood, weight loss, and fever. Airborne transmission through coughing or sneezing was the most commonly selected route (56.7 percent). Knowledge of curability was very high (96.1 percent), and most respondents identified specific drugs from health facilities as the appropriate treatment (73.4 percent). Intended care seeking was encouraging: three in four reported that they would go to a health facility if they developed TB-like symptoms (76.0 percent), and about half would attend as soon as they recognized their symptoms might be related to TB (49.4 percent). At the same time, important misconceptions persisted, including beliefs about transmission via sharing plates or dishes, and a non-trivial minority preferred herbal or religious remedies. Cost, uncertainty about where to go, and transport were the most commonly cited barriers to facility attendance.

4.2. Comparison with previous literature

Earlier studies from Shinile town, Kudat District Sabah, Ethiopia, and two districts of Punjab reported lower awareness and substantial misconceptions regarding symptoms, transmission, and appropriate first action (Tolossa *et al.*, 2014; Koay, 2004; Angelo, Geltore, & Asega, 2020; Mushtaq *et al.*, 2010). In contrast, respondents in our urban sample demonstrated higher recognition of prolonged cough, chest pain, and hemoptysis, and stronger endorsement of biomedical treatment. These differences likely reflect urban residence, higher educational attainment in our sample, and broad exposure to mass media and schooling, which were also associated with better knowledge in prior Pakistani work (Mushtaq *et al.*, 2010).

Consistent with earlier studies, stigma-linked attitudes and the use of traditional or religious remedies were present, although less dominant than in some rural settings (Tolossa *et al.*, 2014; Angelo *et al.*, 2020). The pattern of barriers we observed also aligns with the regional literature. Cost and transport commonly delay care, while uncertainty about where to go suggests navigation challenges within mixed public-private systems (Koay, 2004; Mushtaq *et al.*, 2010). Overall, our findings suggest progress in general awareness but confirm that specific misconceptions and access barriers remain.

4.3. Interpretation and implications

High baseline awareness provides a platform for targeted, myth-correcting communication. Three programmatic priorities emerge:

- **Address specific misconceptions.** Communication should explicitly counter beliefs about transmission through sharing plates or casual contact. Short, visual messages that pair a correct statement with a concise corrective explanation can be disseminated through teachers and family networks, which were the most frequently cited information sources in this survey.
- **Convert intent into earlier action.** Although nearly half would attend promptly, more than one third preferred to wait 3 to 4 weeks. Standard messages should stress that cough lasting two weeks or more warrants evaluation and that early diagnosis improves outcomes. Simple navigation aids can reduce uncertainty about where to go.

- **Lower practical barriers.** Cost was the leading deterrent, followed by transport and clinic navigation. Linking communication to information about free or subsidized TB services, facility locations, hours, and transport options may shorten patient delay. Engagement of pharmacists as referral partners can also redirect first contacts toward appropriate diagnostic pathways in settings where pharmacy consultation is common.

Because many respondents learned about TB from teachers and family or peers, school-based health education and community ambassador models may have strong reach. Health worker engagement should continue, but messages should be harmonized across channels so that family, schools, and clinics reinforce the same core guidance.

4.4. Strengths and limitations

Strengths include a relatively large sample, bilingual administration, and coverage of multiple domains spanning knowledge, attitudes, and intended care seeking. The study also mapped concrete barriers that are directly actionable in local programs.

Limitations warrant careful interpretation. First, recruitment used venue-based intercepts and an open online link rather than probability sampling, which may over-represent educated, urban, or health-interested individuals. Second, all measures were self-reported and may be influenced by social desirability. Third, the questionnaire did not assess knowledge of the exact etiology, and it did not include items on multidrug-resistant or extensively drug-resistant TB, so we could not evaluate those domains. Fourth, we did not include clinical verification and therefore cannot relate attitudes to diagnostic or treatment outcomes. Finally, this cross-sectional design cannot establish causal relationships between knowledge, attitudes, and intended behaviors.

4.5. Future directions

Future surveys should employ probability sampling to improve external validity, include validated KAP scales, and add items on drug resistance and stigma severity. Mixed-methods designs can explore why some respondents delay care in spite of high awareness. Cluster-randomized evaluations of targeted, myth-correcting messages delivered through teachers and family networks could test whether these channels reduce misconceptions and shorten time to first clinical contact in Lahore.

5. CONCLUSION

This community survey from Lahore indicates high baseline awareness of tuberculosis. Most adults recognized cardinal symptoms and viewed formal health facilities as the preferred first point of care. At the same time, important knowledge gaps and misconceptions persist. Many respondents framed susceptibility in terms of weak immunity or social groups rather than universal risk, and a minority endorsed traditional or religious remedies. Practical barriers remain substantial, especially cost, uncertainty about where to go, and transport constraints. These findings suggest that awareness alone is not sufficient to guarantee timely care seeking and treatment completion.

- Target myth correction. Communication should directly address misconceptions about transmission and susceptibility, using simple, bilingual messages distributed through schools and family networks that the community already trusts.
- Make the first step easy. Pair awareness messages with clear navigation aids that specify where to go, opening hours, and what to expect at the facility, including the availability of free or subsidized services.
- Reduce out-of-pocket burdens. Expand free diagnostics and treatment, provide transport vouchers or outreach points in high-traffic areas, and partner with community pharmacies to strengthen referral to appropriate testing.
- Reinforce biomedical care. Emphasize that TB is curable with specific drugs provided at health facilities, while respectfully discouraging delays caused by exclusive reliance on herbal or religious remedies.
- Monitor and refine. Add routine measurement of stigma and delay drivers to local TB program dashboards so that messaging and service design can be adjusted quickly.

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