



**FACTORS INFLUENCING ACCESS
TO TUBERCULOSIS DIAGNOSTIC
SERVICES IN PAKISTAN – AN
ANALYSIS**
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Factors Influencing Access to Tuberculosis Diagnostic Services in Pakistan – An Analysis

A thesis submitted in partial fulfilment of the requirement for the degree of Master of Science in Public Health

By

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Declaration:

Where other people's work has been used (from either a printed or virtual source, or any other source), this has been carefully acknowledged and referenced in accordance with academic requirements.

The thesis "*Factors Influencing Access to Tuberculosis Diagnostic Services in Pakistan – An Analysis*" is my own work.

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3. Abbreviations:

ACF: Active Case Finding
BHU: Basic Health Unit
BMU: Basic Medical Unit
CAD4TB: Computer-Aided Detection Software for TB
DALY: Disability-Adjusted Life Year
DHQ: District Headquarter Hospital
DR-TB: Drug-Resistant Tuberculosis
ECS: Extended Contact Screening
EPTB: Extrapulmonary Tuberculosis
GD: Government Dispensaries
GDP: Gross Domestic Product
GP: General Practitioner
HDI: Human Development Index
IHME: Institute for Health Metrics and Evaluation
LED/FM: Light Emitting Diode/Fluorescence Microscopy,
LHW: Lady Health Workers
LMIC: Low- and Middle-Income Country
LTBI: Latent Tuberculosis Infection
M. tuberculosis: Mycobacterium tuberculosis
MDR-TB: Multidrug-Resistant Tuberculosis
MICS: Multiple Indicator Cluster Surveys
MOH: Ministry of Health
NGO: Non-Governmental Organization
NHA: National Health Account
NTP: National Tuberculosis Program
OOP: Out-of-Pocket
PHC: Primary Health Care
PPA: Patient Pathway Analysis
PPM: Public-Private Mix
RHC: Rural Health Center
SDG: Sustainable Development Goals
SSF: Social Security Fund

TBMU: Tuberculosis Management Unit

THQ: Tehsil Headquarter Hospital

UHC: Universal Health Coverage

UN: United Nations

WHO: World Health Organization

4. Glossary:

Tuberculosis: Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium*. It is transmitted when an infected individual releases the bacteria into the air through actions like coughing or sneezing. While the lungs are the primary target, TB can also affect other organs in the body (1).

TB case detection rate: The percentage of newly estimated and recurring TB cases identified within a specific year through the globally endorsed TB control approach (2).

Missed TB cases: Missed TB cases refer to individuals who:

- Are unable to access diagnostic services due to accessibility barriers.
- Manage to access healthcare services but are not properly diagnosed.
- Are diagnosed but not reported to National Tuberculosis Control Program (NTP) nor given appropriate treatment (3).

5. Introduction:

The two-hour journey from my home in Lahore to the primary health center, DHQ Hospital in Sheikhpura, where I was appointed as a dental surgeon was a routine trip for me. Yet, each time I parked near the Tuberculosis (TB) ward, a sense of urgency gripped me, fueled by my mother's stories of how Pakistan's first national leader, Quaid-e-Azam, was lost to TB. It was here, in this space often avoided by people, that I encountered Farah - a resilient woman amid her battle with TB. Her eyes, weary but determined, held a tale of unwavering perseverance as she recounted her ongoing struggle against the disease. The words she uttered, "If only I had known I had TB earlier, maybe the treatment would have been simpler," echoed in my mind.

Years had passed since the TB ward had seen any significant attention or investment. Patients like Farah were left grappling with insufficient resources and a shortage of medical personnel, as the wider community and even healthcare professionals held back due to misconceptions surrounding TB. The gravity of the situation truly hit home when I observed Fatima, a daughter, tenderly assisting her mother alone, who was also afflicted by this relentless ailment. Their vulnerability became a stimulus for my determination to effect change.

Driven by empathy and a desire for change, I approached my superiors to reshape TB care's narrative. On World TB Day, we convened within the TB ward, giving voice to the experiences of the patients. It was a transformative moment as marginalized voices found resonance, and stories like Farah's began to interweave with tales of struggle and resilience. These accounts, suffused with the challenges of delayed diagnoses and the weight of societal stigma, laid bare the challenging task that lay ahead – that of reshaping public perceptions and fostering a culture of understanding.

Our gesture of empathy did not remain confined within the hospital walls. It ignited a spark that spread throughout the community. In the weeks that followed, the OPD witnessed a surge of cases with presumptive signs of TB – a testament to the potency of a single act of compassion. In the heart of Pakistan's healthcare system, I found myself bearing witness to the profound potential of empathy and engaging community. It was within these walls that I recognized the need for greater awareness, improved diagnostics, and a revived commitment to fostering a more compassionate approach to healthcare, an approach that encompasses community, rights, and gender.

These meaningful encounters gave rise to my quest to comprehend the challenges people face when trying to access tuberculosis diagnostic services in Pakistan. As I immerse myself in my thesis, I am driven by the aspiration to uncover the underlying reasons, explore viable solutions, and maybe, just maybe positively impact the lives of countless individuals across the nation.

6. Abstract:

6.1. Introduction:

In 2021, TB ranked as the second leading cause of death globally, with Pakistan among the top five TB burdened countries. Despite significant efforts, Pakistan's case detection rate stands at 55%, resulting in around 300,000 missed TB cases in 2020. This thesis aims to address knowledge gaps and shortcomings to improve TB case detection and curb disease transmission.

6.2. Methods:

PubMed, VU library, and Google Scholar databases were intensely searched for peer-reviewed articles in English from 2013, alongside grey literature in Pakistan. The inclusion and exclusion criteria guided the screening of abstracts and titles, sorting them into separate Zotero folders. Manual coding was carried out to categorize barriers and facilitators, adhering to Levesque's conceptual framework. Supply side and demand side factors were independently examined, and relevant findings were put in the results.

6.3. Results:

The study identified key supply side barriers such as insufficient awareness provision, limited availability of healthcare facilities in rural areas leading to long travel distances for diagnostics, inadequate infrastructure in public hospitals, and unregulated private sector. On the demand side, barriers included low health literacy, adherence to patriarchal norms, stigma, limited formal health seeking behavior, low income, high out-of-pocket expenses, preference for private providers, crowded living conditions, and delayed access to TB diagnostic services, particularly for females.

6.4. Conclusion:

Both demand side and supply side factors are interconnected, and merely expanding diagnostic services won't suffice to improve access. According to me, an approach that involves community and considers rights, and gender is essential to address complex cultural and structural barriers.

6.5. Word Count:

12.362

6.6. Key Words:

TB diagnostic services

Access to TB diagnostic services

Barriers to TB diagnosis

Missed TB cases

Pakistan

7. Chapter 1: Background

Tuberculosis (TB) is an infectious disease ranked as the second leading cause of death worldwide after COVID-19 in 2021 causing 1.6 million deaths (4). It is caused by the bacteria *Mycobacterium tuberculosis* (*M. tuberculosis*) and is transmitted when an infected individual releases the bacteria into the air through actions like coughing or sneezing. While the lungs are the primary target, TB can also affect other organs in the body (1). In 2014, the WHO declared TB a global public health issue, as around a quarter (1.7 billion) of the world's population was estimated to be infected latently¹ with TB (6–8). However, all individuals who acquire the infection do not progress to active TB disease, and some are able to naturally eliminate the infection from their bodies (9). In 2021, there were approximately 10 million global TB cases, amongst which 60% were adult men while rest women and children (10). TB prevalence varies across regions due to factors such as sociodemographic status, economic conditions, presence of at-risk populations, and comorbidities like HIV (7). Among 30 high TB burden countries, Pakistan ranks fifth and contributes to 61% of TB cases in the WHO Eastern Mediterranean Region (11)

Pakistan is a predominantly Muslim, lower middle-income country (LMIC) situated in Southern Asia along the Arabian sea (12–14). Pakistan is bordered by Iran to the west and Afghanistan to the northwest. In the east, it is adjacent to India, while in the northeast, it shares a border with China. Pakistan is administratively divided into four provinces, Baluchistan, Punjab, Sindh, and Khyber Pakhtunkhwa and a federal territory, Islamabad (13). These are subdivided into 131 districts (15). Pakistan ranks as the fifth most populous country globally, encompassing 240 million residents with an annual growth rate of 1.8%. Only 37% of the population resides in urban areas, while 63% resides in rural areas. Pakistan has a reported median age of 22 years, and the age group between 15 and 64 years represents approximately 59% of the population (12,16). The male-to-female sex ratio is 1.03, and the transgender population is approximately 10 thousand (16,17).

Approximately 35% of Pakistan's population lives below the poverty line, with the poverty rate² exceeding 40% in rural areas (19). Pakistan's economy is experiencing significant strain, characterized by depleted foreign reserves, a devaluing currency, and elevated inflation levels. The catastrophic floods that occurred in 2022 have dealt a severe blow to the country, causing a loss of \$30 billion. Approximately 33 million people have been affected, and the disaster has led to 8 million individuals being pushed below the poverty line (20). Pakistan, with a low Human Development Index (HDI)³ of 0.54, faces the challenge of a projected poverty rate by World Bank of 37.2% in 2023. In comparison, neighboring countries India and Bangladesh have higher HDIs of 0.63 and 0.67 respectively (22). The labor force participation rate of women in Pakistan is 25%, indicating the existence of gender-based disparities and inequalities within the country. This gap contributes to an approximate 3.73% reduction in Pakistan's HDI value (12,23).

In Pakistan, the overall literacy rate for adults stands at 58%, with women representing only 46% of the literate population (12,24). Additionally, significant disparities exist between rural and urban regions, with urban areas having a higher literacy rate of 74% compared to 52% in rural areas (25). The low literacy rate is attributed to factors such as limited resources, ineffective governance, gender inequalities, lack of awareness, and poverty (19). A study in Pakistan revealed a positive relationship between education level and health, likely influenced by individuals' behavior. Higher education levels were associated with better risk factor management and improved health outcomes (26). On average, the size of household is 6.4 individuals per house (27). This significant number increases the likelihood of at least one member having pulmonary TB, which increases the risk of exposure for other household members (28).

¹ Latent TB infection occurs when the body contains *M. tuberculosis*, but the individual doesn't show any symptoms of TB because the bacteria are dormant. This state doesn't cause illness or transmission of TB to others. If left untreated, latent TB can progress to active TB (5).

² The poverty rate represents the proportion of individuals whose income is below the designated poverty threshold (18).

³ The HDI is a combined measure of a country's achievements in health, education, and economic well-being (21).

The healthcare system in Pakistan comprises of both public and private sectors (Fig 1) (29). Around 70% of the population relies on the private sector for healthcare, which encompasses a wide range of healthcare providers, including nurses, doctors, pharmacists, traditional healers, laboratory technicians, shopkeepers, drug vendors and unqualified practitioners (29). The relatively less utilized public health delivery system in Pakistan operates with a three-tier approach, encompassing primary, secondary, and tertiary levels of care (30). Curative and rehabilitative services are primarily available at secondary and tertiary care facilities. Preventive and promotive services are delivered through national programs along with the assistance of community health workers who engage with communities through primary healthcare centers and outreach initiatives (29). At the primary level, healthcare is provided through Government Dispensaries (GD), Basic Health Units (BHU) located in villages, and Rural Health Centers (RHC) situated in towns. At secondary level, there are Taluka Head Quarters (THQs) and District Head Quarters (DHQs) in taluka, districts, and large cities. At the tertiary care level, specialized healthcare services, including in-patient care and referrals from primary and secondary levels are catered. Under the 18th amendment in Pakistan, healthcare services are primarily the responsibility of the provincial government, excluding the federally administered region (30). Certain government and semi-government entities, including the armed forces and parastatals like Fauji Foundation, Railways, Sui Gas, Employees Social Security Institution and WAPDA offer healthcare services to their employees and their dependents through their independent systems. However, these services only cater to approximately 10% of Pakistan’s population (29).

The National Health Vision Report 2016-2025 emphasizes inadequate regulations in Pakistan's private healthcare sector concerning pricing and service redundancy. Additionally, it contributes the least to preventive and promotive health services, despite its potential to do so. On the other hand, the public sector faces challenges related to inadequate staffing levels, job satisfaction, and the work environment (31).

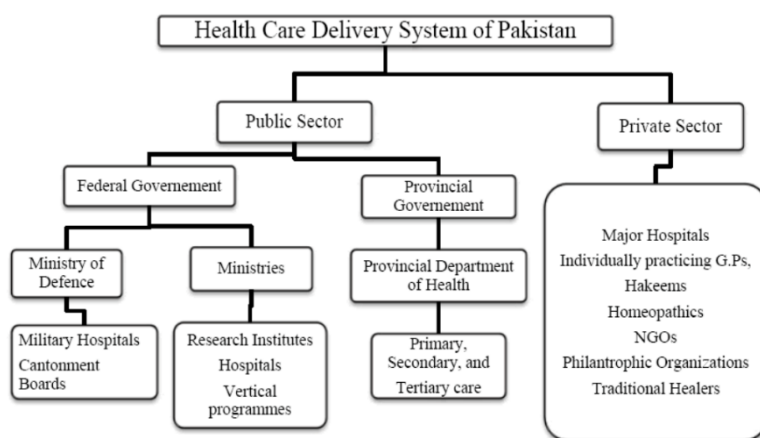


Fig 1. Health care delivery system of Pakistan (30)

At present, Pakistan allocates 3% of its Gross Domestic Product (GDP) to healthcare expenditure (32). With a Universal Health Coverage (UHC) of 45, Pakistan must triple its healthcare spending from to 8.2% by 2030, to achieve the Sustainable Development Goals (SDG) targets (33,34). As shown in Fig 2, out-of-pocket (OOP) payments constitute 55% of healthcare expenses in Pakistan. This places a substantial financial burden on individuals, especially the poor, as they have to allocate a significant portion of their income to cover healthcare costs (32,35). A further breakdown of OOP indicates that the majority, 81%, of healthcare expenses were incurred in private healthcare facilities, whereas only 19% of the expenses were associated with public health facilities (36). The findings of the Multiple Indicator Cluster Survey (MICS) show that a small percentage of women (3.2%) and men (3.9%) aged 15-49 have reported having health insurance coverage (37). Limited research suggests that religious

beliefs and the presence of an informal economy contribute to the low adoption of health insurance (37,38). However, health insurance is not mandatory in the country by legislation (39).

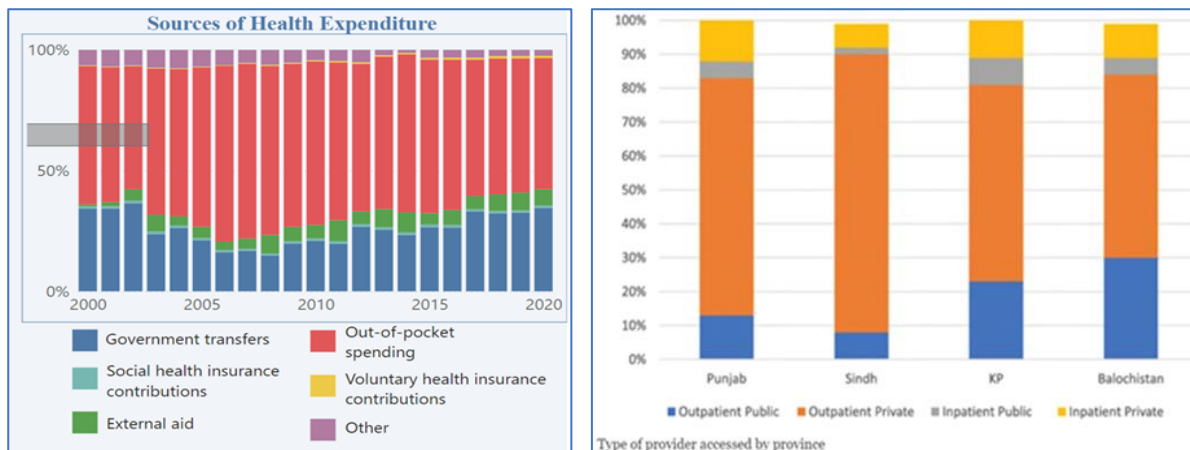


Fig. 2. Sources of health expenditures in Pakistan (32) Fig 3. Types of providers accessed by province in 2013-14 (36)

Pakistan's health sector grapples with critical challenges related to human resources including a severe scarcity of healthcare professionals, particularly nurses, midwives, and lady health workers (LHWs). The skill distribution healthcare professionals are skewed towards doctors who often prioritize their private for-profit practices. There is also imbalance in the geographical distribution of the health workforce, with more deployment in urban hospitals, which exacerbates disparities between urban and rural areas (40). The doctor-population ratio, nurse-population ratio, and hospital beds to population ratio are 1.1, 0.5 and 0.6 per 1000 people, which falls below the recommended standards set by the World Health Organization (WHO) (12,40).

TB services are provided by various institutes. The National TB Control Program (NTP) was reinstated under the Ministry of Health (MoH) after TB was declared a national emergency in 2001. Presently, the NTP collaborates with the National Institutes of Health in Pakistan. The NTP serves as a collaborative entity at the central level, overseeing the development of standardized policies and strategies for TB control. It also serves as a liaison with national and international donors, ensuring effective coordination and communication. The NTP is utilizing the Single Stream Funding (SSF) mechanism as the principal recipient to implement a Global Fund-supported grant (41). In 2021, around 8% of the total budget of \$47 million⁴ allocated to TB was funded domestically, with the rest coming from international sources primarily Global Fund. However, from 2018 the international funding has been on a decline (8). This can be attributed to the COVID-19 pandemic. In 2021, TB prevention, diagnostic, and treatment services were allocated \$3.7 million domestically from the health budget, while international funding provided \$43 million, leading to a substantial budget gap of 58% (42). This gap indicates a crucial lack of resources required for efficient TB diagnosis and control efforts in Pakistan.

TB care services are divided into public and private sectors. The public sector includes NTP and Non NTP services (15) that are supposed to offer free diagnostic and treatment services at all levels of care. In the private sector, different models of care exist including Public Private Mix (PPM)-1-4 approach, with minimal costs borne by the facilities and support from the Global Fund. Since a significant proportion (70% as mentioned above) of the population seek healthcare from private providers, it is crucial to involve them in TB care services (43). The PPM approach aims to establish collaborations between private practitioners and the public sector, aiming to improve access to and standardization of TB care. Initially focused on enhancing the case notification rate through general practitioners (GPs), the PPM program has now expanded to include all types of the private sector, such as non-governmental organizations (NGOs), private hospitals, parastatal, and other public hospitals. Specifically, private sector hospitals, Tuberculosis Basic Management Units (TBMU), and NGOs offer microscopy services under this program (34). PPM-1-4 models are implemented for GPs, NGOs, private hospitals, and parastatals respectively. Over 2000 GPs, 438 private labs, 122 NGO networks, 35 private hospitals, and

⁴ The '\$' symbol represents the US dollar.

33 parastatal hospitals, including armed forces health facilities, are engaged in TB case management. PPM is reported to have doubled TB case notifications from 20% in 2013 to 41% in 2019.

8. Problem Statement:

In 2021, Pakistan had an annual incidence of 611,000 TB cases including 36,000 Multidrug-Resistant Tuberculosis (MDR-TB)⁵ which contributes 5.8% to the global burden of TB (1). The TB incidence rate in Pakistan for 2021 was 264 cases per 100,000 population, significantly higher than the global estimate of 134 cases per 100,000 population (6). The escalating prevalence of drug-resistant TB strains is also a pressing concern, as Pakistan ranks fourth among countries with a high burden of MDR-TB, contributing 7.2% to the global burden (7) and an annual incidence of 28,000 cases (34). Other countries contributing significantly to the global burden of TB include India (27%), China (8.5%), Indonesia (8.4%), and the Philippines (6.0%) (1). The annual prevalence and mortality rates per 100,000 population for TB in Pakistan are 340 and 20 respectively (45). The age group most impacted by TB is 15-49 years (9).

Similar to the situation worldwide, Pakistan also faced overwhelming challenges in its healthcare system due to the pandemic's onset in March 2020 (10). According to WHO TB Report 2021, among the top five countries contributing to the global gap between estimated TB incidence and actual reported cases, Pakistan accounted for 6.6% of the total gap (7). Out of the estimated 573,000 new cases in 2020, only 48% (n=276,736) cases were officially notified, leaving around 300,000 missed cases (11,46). "Missing" individuals with TB refer to those who are unable to access diagnostic services due to accessibility barriers, who manage to access healthcare services but are not properly diagnosed with TB or are diagnosed but not reported to NTP nor given appropriate treatment (3), including those with MDR-TB (47). The challenges of locating, diagnosing and treating these patients are impeding the advancement of TB care and jeopardizing the progress achieved since 1995 (48). Despite the fact that TB is treatable, transmission continues to occur due to presence of unidentified cases (49). Closing this gap in case detection is a crucial priority to meet the End TB targets, which aim to reduce TB incidence by 80% and TB deaths by 90% (50).

8.1. Justification:

The low detection of TB cases leave the community with undiagnosed cases that contribute to the continued spread of the disease within families and communities, as each active case has the potential to infect 10-15 people annually (47,51,52). Early testing, diagnosis and prompt treatment are crucial to prevent the burden of TB and emergence of drug resistant strains which contributes to the global burden of antimicrobial resistance and strains healthcare budget (53,54). Despite significant efforts being done to combat TB in Pakistan, Pakistan's case detection rate stands at 55% (12). This thesis aims to address the knowledge gaps and shortcomings related to the low case detection rates of TB in Pakistan (55). By addressing factors affecting access to TB diagnostic services in Pakistan, this review contributes to the United Nations (UN) SDGs and The Global Plan to End TB 2023-2030.

⁵ MDR-TB is caused by a strain of TB bacteria that is resistant to the key drugs isoniazid and rifampin, crucial for treating all TB cases, making diagnosis and treatment difficult (44).

9. Objectives:

9.1. General Objective

To analyze the factors contributing to the low case detection rates of tuberculosis in Pakistan, and make recommendations to MoH, Healthcare Providers and Policy Makers to improve access to TB diagnostic services.

9.2. Specific Objectives

- 1) To analyze supply side barriers and facilitators affecting access to TB diagnostic services.
- 2) To analyze demand side barriers and facilitators affecting access to TB diagnostic services.
- 3) To offer actionable recommendations aimed at enabling the MoH, healthcare providers, and policymakers to identify and diagnose a greater number of individuals with TB in Pakistan.

10. Chapter 2: Methods

10.1. Methodology and Search Strategy:

An intensive review of the literature was conducted using various databases including Vrije University online library, PubMed, and Google Scholar. The search focused on peer-reviewed articles published in the last 10 years in English. Additionally, libraries worldwide were explored to gather relevant information. Quantitative data from sources such as the WHO, National Health Accounts (NHA), World Bank, Global Fund, STOP TB, and International Health Metrics and Evaluation (IHME) were accessed to compare the occurrence of TB over different time periods. Medical Subject Headings (MeSH) terms were used in PubMed searches, along with a table of keywords, provided in the annex 1. The keywords, guided by the objectives and analytical framework, were used independently or in combination with Boolean Operators ("AND" and "OR") to facilitate exploration. Grey literature from WHO, MoH, and NTP websites were also included in the search to supplement the findings. The search was supplemented by snowballing to identify relevant studies.

In the initial screening process, titles and abstracts of various articles were reviewed to identify relevant papers. Articles that investigated aspects related to TB preventive and diagnostic services accessibility, occurrences of missed TB cases, low case detection rates, and the factors influencing TB case identification from both the perspectives of consumers and providers within the context of Pakistan were prioritized. Articles meeting the criteria were further examined for inclusion or exclusion. The search focused on English language papers from the last 10 years and only those are analyzed in the results. The characteristics of all included studies are provided in annex 2.

Articles that focused on attrition of TB patients after diagnosis, delayed treatment initiation, co morbidities such as diabetes and HIV, childhood tuberculosis were excluded. Both comorbidities and childhood TB have specific characteristics and underlying causes that are different from the factors influencing case detection rates in the adult population such as challenging diagnosis (56). The determinants that contribute to comorbidities or childhood TB may not be the same as those influencing the detection rates of TB cases specifically in adults. Key populations have different sets of challenges and that is beyond the scope of this thesis. Studies in a language except English, conducted in a non-Pakistani context and unavailable as a full article were also excluded. An exception was made for one study (57) conducted in Nepal, Bangladesh and Pakistan only because the data of this study is directly relevant to the objectives of this thesis. However, it is important to note that the primary focus of the thesis remained on data collected solely from Pakistan, with the data from the other two countries serving a supplementary role.

The data collected from the selected studies was systematically organized. The information was categorized into themes and sub-themes based on the Levesque framework. For instance, one theme was "approachability," and its sub-themes included "transparency," "outreach," "information," and "screening." A table (see annex 3) was created to facilitate manual coding of barriers and facilitators for each study. Barriers were denoted with the code (-), and facilitators were indicated with the code (+) representing text fragments as examples. The significant findings were presented in the results section of the review. No ethical clearance was necessary as primary data collection was not conducted.

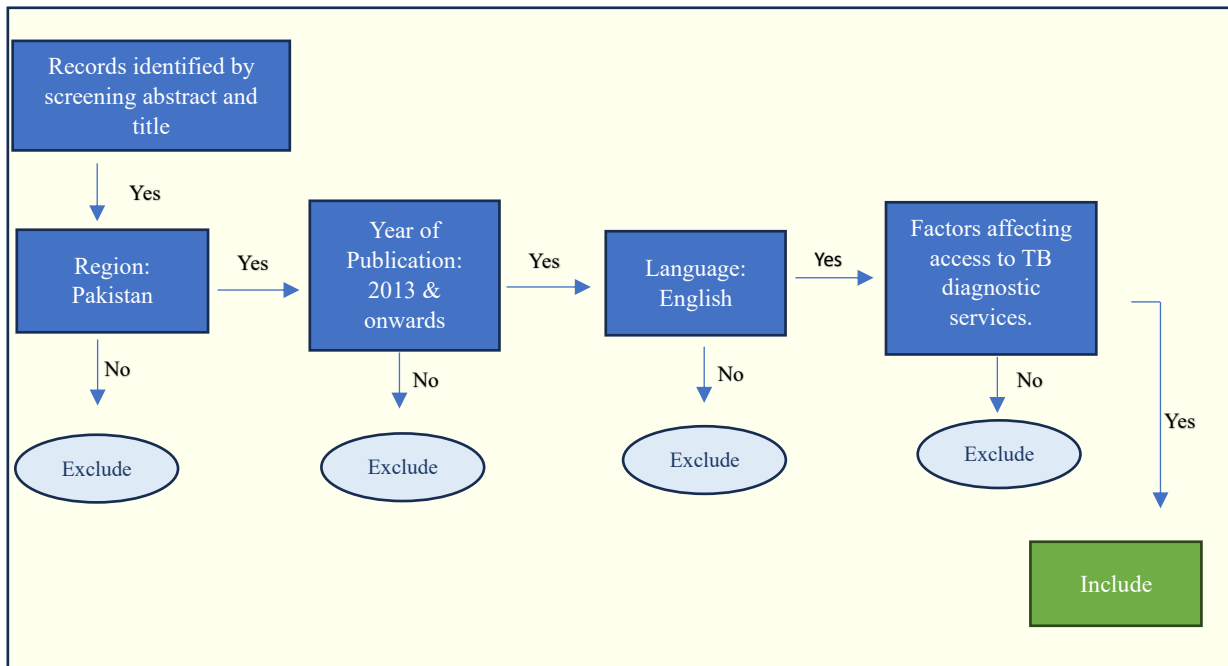


Fig 4. Flowchart illustrating screening process for inclusion and exclusion of studies.

Table 1. Criteria for Inclusion and Exclusion

Topic	Inclusion Criteria	Exclusion Criteria
Study Population	TB patients (men and women) from rural and urban areas.	TB patients with comorbidities e.g., HIV, Diabetes Children with TB
Geographic Location	Pakistan	Other than Pakistan
Study Type	Qualitative, Quantitative, Mixed Methods, Systematic Reviews, Case Study	Newspapers, social media platforms, blogs.
Year of Publication	2013 and onwards	Before 2013
Language	English	Other than English
Content	Factors affecting access to TB diagnostic services (demand + supply side)	Factors affecting access to TB services post diagnosis, pretreatment, and post treatment (adherence)

10.2. Conceptual Framework:

The Levesque framework for healthcare access was employed as a conceptual framework in this thesis. The framework encompasses supply side factors such as approachability, acceptability, availability and accommodation, affordability, and appropriateness incorporating the abilities of individuals and populations to perceive, seek, reach, pay, and engage in healthcare, while also acknowledging the impact of socioeconomic determinants (58,59). Given the inequities in healthcare access in Pakistan, this framework allows to take into account demand side facilitators and barriers as well, as access extends beyond the failure of health systems (59,60). Taking a patient-centered approach and gaining insight into the healthcare experience from the patient's perspective can enable healthcare providers to better address patient needs and enhance the health outcomes (61). This was preferred over Andersen's as this will allow analyzing health seeking behavior of individuals with limited agency such as socioeconomically disadvantaged individuals and enable identification of gaps that exist to empower them. Results will reveal additional individuals in this sub-theme.

This framework has been effectively utilized to identify factors in accessing care for Non Communicable Diseases (NCDs) within an LMIC context (62). It also has been used to explore access to primary healthcare services (63) and maternal healthcare services (64) in LMIC contexts. However, it has not been used to explore access of TB diagnostic services in Pakistan yet, or elsewhere in my knowledge, which makes it a unique attempt.

The framework was finalized with supplemental support from the TB care continuum (see annex 4), which helped identify the major gaps along TB care as 1 (referring to the no. of patients who did not undergo a TB diagnostic test) and 2 (referring to the no. of patients who remained undiagnosed) in LMICs (65,66). TB continuum was not considered in isolation as it does not help identify the facilitators and barriers to accessing services (67). Successfully addressing the issue of missing tuberculosis patients requires understanding their interactions with the healthcare system and designing tailored services to meet their needs (68).

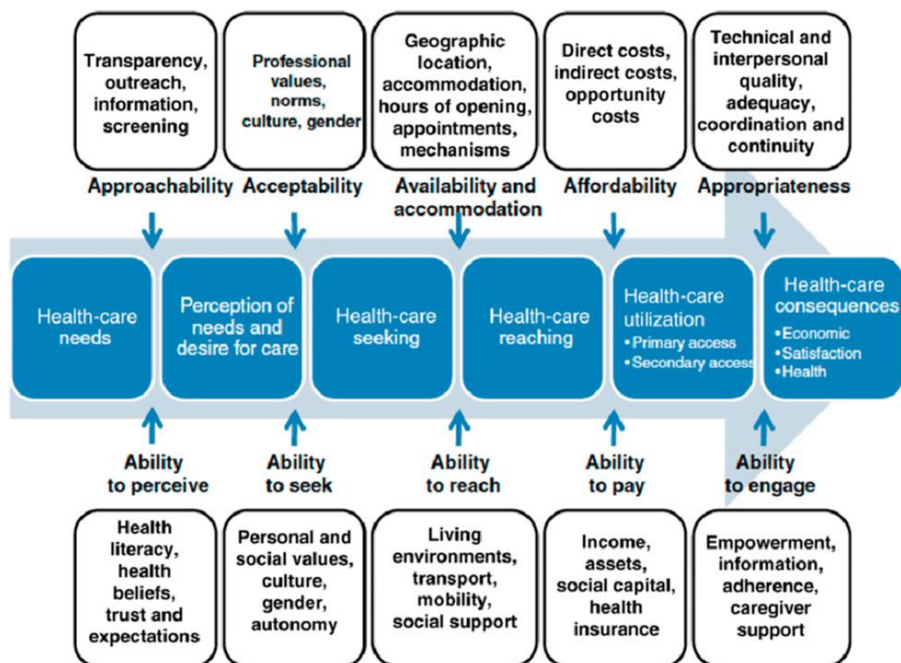


Fig 5. "Levesque conceptual framework for healthcare access." (58)

10.3. Chapter 3: Results

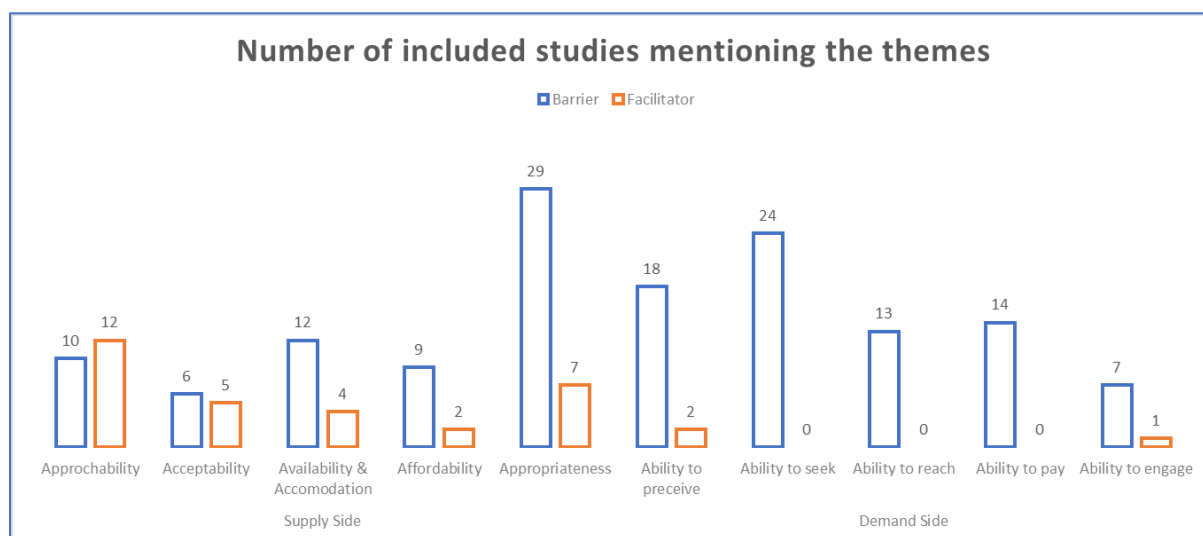


Fig 6. No. of included studies mentioning themes.

Figure 6 presents the count of studies referencing distinct themes from the Levesque framework. Annex 2 provides details about the attributes of all 29 studies incorporated. Annex 3 outlines the procedure for coding text segments as barriers and facilitators. In the subsequent sections, I will examine my discoveries within each highlighted theme and its corresponding subthemes, denoted in italics.

10.4. Supply side factors affecting access to TB diagnostic services:

10.4.1. Approachability:

Approachability is determined by the level of awareness among individuals with health needs regarding the existence of healthcare services, which in turn impacts their ability to access services (59). Elements such as transparency, information, outreach, and screening determine the approachability of TB diagnostic services. *Transparency* has been identified as a barrier in 3 studies, as the government's control over the NTP inherently carries socio-political influence, raising questions on the extent and validity of data disclosure (69). This can be attributed to a lack of political willingness to promote openness and accountability as mentioned by NTP managers of Pakistan (70).

4 studies mention lack of awareness provision regarding TB which poses a risk of transmission. In qualitative research, it was found that participants had no *information* on BCG vaccination, a preventive measure for TB, when discussing disease prevention (69,71). In a rural district of Sindh, among 36 women aged 26-49 years, all were aware of TB signs and symptoms, but half had misinformation about transmission and the availability of diagnostic services, associating spread with unhealthy diet and sexual intercourse (72). In South Punjab, there was a general lack of TB knowledge observed among the public and TB patients, with 88% of 300 TB patients being unaware of risk factors. Health workers provided unnecessary advice, such as avoiding food preparation, not sharing utensils, and limiting contact with children, disproportionately affecting women in Pakistan's patriarchal society, limiting their *ability to seek* diagnosis (57). Sources of *information* varied in provinces. In KPK, household members, friends, and television were reported as the primary sources while insufficient *information* provision was observed by doctors and LHW (71). In other provinces, though doctors were the main source, but *information* provision was insufficient (73).

Outreach activities like active case finding (ACF)⁶, extended contact *screening* (ECS), and door-to-door *screening* are not only effective in identifying individuals who may have been missed otherwise, but also serve as facilitators, improving individuals' *ability to pay* (75–77). In Karachi, an ACF *outreach*

⁶ ACF involves actively screening for potential TB cases within a population, and those with positive screening results are referred for diagnostic tests (74).

in family clinics led to 999 more diagnosed cases compared to the PCF approach between January 2011 and December 2012. Trained health workers stationed at these clinics conducted verbal *screenings* of patients and their attendants, referring individuals suspected of having TB for diagnostic services like chest X-ray, microscopy, and GeneXpert. Although the ACF approach had higher initial costs per patient, a cost-effectiveness analysis revealed that it resulted in the addition of 0.02 Disability-Adjusted Life Years (DALYs)⁷ per patient and saved \$15.7 per patient. This is attributed to reduced *indirect costs* such as *transport* and food expenses as ACF required fewer visits (2 visits costing \$2 each) before utilizing diagnostic tests, while the PCF approach necessitated 5 visits at \$4 each before smear microscopy was conducted (78).

Screening is cited in 8 studies as a facilitator for enhancing TB case detection. From 2013 to 2015, in 4 urban cities of the country, ECS demonstrated its ability to identify a higher proportion of men who might have otherwise been missed using the PCF approach (76,79). Several factors could explain the higher rate of undetected TB cases among men in Pakistan, including their primary role as family earners, geographical barriers to accessing diagnostic services, financial constraints, occupational exposure, smoking etc. This emphasizes the significance of screening at GP clinics, which are more approachable and can identify cases at earlier stages (79). Moreover, in ECS group, 88.0% (n=4052) of cases were confirmed through laboratory testing, in contrast, PCF group had 50.3% of cases confirmed via lab testing (76). This highlights the effectiveness of *outreach* over passive approach. Use of computer-aided detection software for TB (CAD4TB) with symptomatology for TB screening in symptomatic individuals is observed in addition to targeted *screening* of neighborhood contacts which also proved productive, showcasing the benefits of intensified screening efforts (80,81). However, ensuring *accommodation* for all genders is of utmost importance. As it was seen in a 2-year screening program in Karachi, only 22.4% of 311,732 participants were women, possibly due to the predominance of male staff, who are easier to recruit for public settings, posing a barrier for female involvement (82).

Contact *screening* has been reported as a barrier in two studies, one in Karachi where no contact *screening* was done for (91.5% n=472) patients despite 21% of 516 participants residing in overcrowded households (43). This raises questions about the *appropriateness* of the diagnostic services delivered. Another study conducted in Karachi further highlighted the issue as it was found that both public and private healthcare providers had limited knowledge of contact screening, with private practitioners and females scoring worse. This reflects the lack of opportunities for doctors to update their knowledge in the unregulated private sector, coupled with constraints such as time limitations and motivational factors (83).

10.4.2. Acceptability:

Acceptability of healthcare services is influenced by professional values, cultural norms, encompassing factors such as the gender of providers and the perceived appropriateness of healthcare services (59). Patients perceive private practitioners to have better *professional values* in comparison to public ones, also discussed under the *appropriateness* theme. In South Punjab, 42% of the 300 TB patients registered under NTP reported encountering negative behavior from healthcare workers (84). On the other hand, LHWs demonstrate better adherence to *professional values*, driven by their dedication to serving humanity, which aligns with their moral and religious beliefs (85).

Pervasive patriarchal societal *norms* have been observed to influence the health seeking behavior of women (72). *Cultural* restrictions on interactions between men and women in society hinder women from accessing services from male providers as there is a reported lack of female healthcare providers in both private and public sectors (72,83). The underrepresentation of females in Pakistan's physician workforce was highlighted in 2 studies conducted in 2013, in Karachi (urban) and Attock (rural), where out of 196 and 48 physicians surveyed, only 38% and 14% were women respectively (83,86). This raises concerns about the gender ratio particularly in rural areas where society is more gender sensitive.

⁷ A single DALY signifies the deprivation of a year of complete well-being (2).

10.4.3. Availability and Accommodation:

Availability and accommodation pertain to the presence of easily accessible services with adequate capacity to provide timely and efficient care (59).

In 6 studies, *geographic location* emerged as a barrier, with the distance to the nearest healthcare facility being cited as a hindrance to accessing diagnostic services for the majority of participants (73). Limited transportation options in Sindh compounded the issue. Public buses were insufficient and unreliable, while private transport was expensive but also scarce (72). LHWs in rural Sindh highlighted the challenge of persuading symptomatic patients to undergo diagnostic tests at health facilities due to financial constraints as mentioned under *indirect costs* (85). Patients traveling over 30 km were 4.13 times more likely to experience diagnostic delay (95% CI: 1.02–16.6) compared to those traveling shorter distances (87).

Accommodation is mentioned as a barrier in 12 studies. In rural Sindh and among Internally Displaced Persons (IDPs), lack of facilities and doctors in the villages emerged as a primary barrier, necessitating long-distance travel (40-200 km) to access TB diagnostic services (72,87). Unavailability or shortage of public doctors results in one of the reasons of the low utilization of public sector health services across Pakistan, leading people to seek TB care from private providers instead (73,86,88). This skewed health seeking behavior is why the implementation of the PPM model proved more effective in identifying TB cases in Sindh compared to the non-PPM model (88). The absence of facilities contributes to the lack of TB awareness, as there is no available source of *information* (72). Additionally, gender insensitive facilities are also a concern (82).

Patients residing in rural areas encounter a multitude of challenges, including inadequate access to healthcare facilities and deficient infrastructure such as poorly developed roads (87). This limited access to healthcare options, prompt working-class individuals, particularly those aged 35-54, to prefer seeking referrals from pharmacies due to the convenience of easy access and prolonged *opening hours* (89).

Appointment mechanisms play a crucial role in motivation levels of patients to seek care. A study involving 572 TB participants found that 17% of them had to wait over 45 minutes for a consultation. Interestingly, females experienced this prolonged waiting time 5% more frequently than males (73). The consultation time in Primary Health Care (PHC) settings is reported to be limited (86), possibly due to longer queues. In contrast, private healthcare settings tend to offer more adequate consultation time (73), potentially resulting in better patient experiences and reduced waiting times.

10.4.4. Affordability:

Affordability refers to individuals' ability to pay to allocate resources and time to access suitable healthcare services (59). A cross-sectional study conducted in Karachi revealed that median pre-diagnostic cost of TB is \$63.8 constituting 49% of households' OOP expenses. Out of this, around \$20.2 was attributed to *indirect costs* due to travel, waiting time, and missed work. Direct costs were associated with informal care practices and seeking diagnostic tests from private facilities, which imposed significant expenses compared to public facilities. This is deeply interlinked with the individual's *ability to pay*. These findings highlight the existing lack of *trust* in affordable services provided by public healthcare facilities (43,79). In 2017, community pharmacies in Punjab also identified consultation fee charged by GPs for diagnosing presumptive TB patients as a barrier (89). LHWs emphasized that impoverished patients they refer for TB diagnostic services encounter obstacles related to transportation expenses. While LHW personally cover transportation costs for all symptomatic individuals, they are only reimbursed for those who test positive for TB (85).

No relevant data was found on *opportunity costs*.

10.4.5. Appropriateness:

Appropriateness entails tailoring services to individual needs, including timely assessments while considering healthcare providers' technical expertise and interpersonal skills. Adequacy involves providing high-quality, integrated, and continuous services throughout the diagnostic process (59).

Technical and Interpersonal quality:

In 2011 in Karachi, assessment of 196 healthcare professionals from private and public sectors, revealed inadequate knowledge of diagnosing a TB case was significantly associated with being female, having private employment status, and lacking NTP (83). Additionally, during a 3 month period in 2012 across 12 districts in Pakistan, only 26% of the total 8,346 detected TB cases were identified by private providers, including labs (15). An analysis of the PPM model from July 2015 to June 2016 revealed that NGO facilities implementing the PPM model in Sindh had a higher rate of identifying and notifying TB cases compared to GP facilities. Private hospitals were also effective in identifying TB cases, suggesting their potential as a resource for enhancing case detection (88). NGOs play a role in facilitating identification of missed cases (77). Further research is needed to understand why NGOs have a higher rate of detecting cases compared to GPs. But their quality is questionable, as in 2016, a study revealed NGOs and GP facilities demonstrated a tendency to excessively depend on radiography, suggestive histology, and insufficiently utilize sputum smear microscopy for diagnosing TB which contributes to missed cases (88,89).

The situation with private healthcare providers in Pakistan is concerning, as out of nearly 10,000 private hospitals and diagnostic laboratories, which constitute approximately 83% of all healthcare facilities in the country, less than 1% of them report TB cases to the NTP (68). In a 2018 systematic review that evaluated the diagnostic knowledge and usage of sputum microscopy among practitioners, seven studies indicated that less than 50% of practitioners were aware of the importance of microscopy as a primary diagnostic tool. Furthermore, the utilization rates of sputum microscopy varied and were generally low when compared to the National Guidelines for TB control and International Standards of TB Care (ISTC) which suggest existence of a “know do” gap among providers (90). Lack of attentiveness, preferential treatment, and unavailability of public doctors and staff, as well as the difficulty in accessing services without references, discourages individuals from accessing public health facilities although they offer free diagnostic services (72,73,88). Whereas, for private providers, 84% (n = 484) reported that their doctor and paramedic catered them attentively and respectfully (72,73). But less than half of the country's private practitioners adhere to NTP guidelines, leading to insufficient advice for sputum microscopy in TB diagnosis (34,90). A study mentioned that TB is not mandatory by law in Pakistan (15) which can also be the cause of less motivation of private providers to engage in actively identifying TB cases, but this finding is no more relevant.

A study comparing GeneXpert testing to LED/FM microscopy (variant of sputum microscopy) in KPK with a sample size of 737, revealed case detection rates as 13% (n=95) and 7% (n=52) respectively. GeneXpert demonstrates high specificity and sensitivity, requires minimal skills to operate, and has double the detection rate of microscopy (91). This finding is consistent with a study conducted in Peshawar, which involved screening around 27,000 individuals. Out of these, 2,617 individuals were referred for diagnostic testing, but only 2,100 provided their sputum samples. Among these, 87% (n=1,825) were identified as presumptive TB cases based on the CAD4TB screening tool. However, when these individuals were tested using GeneXpert, only 8.7% (n=159) were found to be positive for TB. Although CAD4TB is a useful screening tool for identifying individuals who may be at high risk of TB, however, due to its 13% specificity, there is a potential for false positives if used for diagnosis purposes (80). The table shows comparative analysis of accuracy measures of above-mentioned tools.

Table 2. Comparison of accuracy measures of TB diagnostic tools

Study	Sample Size	Accuracy Measures	GeneXpert	LED/FM Microscopy	CAD4TB
(91)	737	Sensitivity	73%	40%	
		Specificity	100%	100%	
(80)	1825	Sensitivity	81.4%		83%
		Specificity	93.4%		13%

Adequacy: Only 1 study showed there has been a statistically significant correlation ($p < 0.01$) between patients' perception of consultation time *adequacy* of private providers and their satisfaction level (73). Whereas public hospitals are crowded with a lack of adequate consultation time.

In district Tando Allayar, Sindh, with a population of 575,720, the low case detection rate (29%) can be attributed to limited and poorly resourced health facilities. The district has only 14 BHUs, 3 RHCs, and a single 100-bed tertiary care hospital. The inadequacy of health services, limited staff presence, and restricted work hours at the 2 TBMU, combined with the distance to larger cities like Hyderabad (40 km) and Kotri (50 km) with better diagnostic facilities, pose significant challenges for the population in accessing timely TB diagnosis (72). The *geographical location* of facilities is interlinked with the individual's *ability to pay*.

A review reveals that out of 500 BHUs across the country, only 124 possess the infrastructure for provision of TB care and establishing referral linkages with specialized care (34). This is consistent with findings related to inadequate diagnostic infrastructure in Pakistan in a patient pathway analysis (PPA) conducted at the national level to evaluate the presence of TB diagnostic services across various private and public facilities. Results revealed that among TB patients accessing healthcare, 87% preferred private sector while 13% accessed public facilities. Amongst 980 public facilities only 48% were equipped with microscopy services. In the province of Punjab, the analysis revealed that at the L1 level (which includes BHU, RHC), 24% of the facilities had microscopy services available, while at the hospital level, 50% of facilities offered microscopy services. In contrast, in the province of Sindh, only 5% of L1 level facilities and 23% of hospitals had microscopy services available. A mere 5.4% of all TB patients accessed microscopy services for their diagnosis. Interestingly, despite having a higher diagnostic coverage, Punjab had the lowest public sector utilization (11%) (68). This behavior can be attributed to factors such as perceived low quality of services offered at public facilities, longer waiting times, lack of *trust* in public providers, better experiences with private providers etc. It also revealed that private sector of Pakistan is better equipped with TB treatment services compared to diagnostic services (68).

Coordination: The private health sector in Pakistan is characterized as extensive, varied, and lacking regulation, which poses challenges for collaboration but possesses *acceptability* amongst consumers (70,79). The NTP criteria required all physicians to seek advice from TB Focal Persons at their respective diagnostic centers when faced with diagnostic challenges, only 2 out of 48 adhered to this requirement in Attock District in 2013, as the rest expressed doubts about the expertise and competence of available district experts (86). The lack of effective referral systems, inadequate linkages between PHC and higher levels of care, more emphasis on performance targets rather than quality of care prevent physicians from following NTP guidelines (86). In 2014, NTP launched PPM to engage private practitioners in enhancing case detection rates. It was implemented in 92 districts across the country using various strategies, resulting in a contribution of 25% (n=81,016) increase to the overall national TB case notification from July 2015-June 2016 (88). The results suggest that PPM has the potential to increase the case detection in the country. Unfortunately, only 5% of GPs actively participate in TB diagnosis by reporting cases to the provincial and national databases (34). There was an improvement noticed in 2016, when 25% of the 327,002 cases in Pakistan were detected via PPM initiatives, with 45.8% solely identified and reported by GPs (88).

In Punjab, a study involving 500 community pharmacies led to the diagnosis of 547 new TB cases in 2017, contributing to 9% of private sector TB cases. This underscores the significance of PPM partnerships beyond physicians to identify missing individuals (89). During Jan-Sep 2019, 957 LHWs screened 991,128 individuals for TB symptoms. They identified 4,798 presumptive TB cases, of which 79% (n=3,790) underwent testing at health facilities. Ultimately, 22% (n=841) were diagnosed with TB highlighting the significance of task shifting (77). However, this facilitator was only found in Sindh and non-existent in all other provinces (34). Consistent and efficient *coordination* between the NTP and the LHW program was essential for achieving improved case detection outcomes (77).

Moreover, in 2019, there were 1,746 laboratories testing for TB, including 411 private sector labs. Additionally, 327 GeneXpert laboratories were installed with 295 GX-IV and 66 GXXVI modules, to scale up case detection across the country. But there is a reported absence of a standard method of transporting sputum samples from primary facilities to closest diagnostic or GeneXpert facility (34). This could lead to diagnostic delays and sample degradation.

Continuity: Lack of sustainability is mentioned as a barrier in 3 studies. Provincial and national TB managers expressed apprehensions about the long-term sustainability of the TB control program. They emphasized the importance of integrating the TB control program into the broader health system to ensure its continued effectiveness. The managers highlighted the need for domestic prioritization and increased funding for TB, as it would demonstrate political will and attract more international funding from donors, which is currently lacking. The Global Fund was reported to bear significant costs, but this may not be highly sustainable (70). This finding is a direct result of the significant budget gap of 58% (42) and the decline in funding for TB, as mentioned in the section on TB services.

Engagement of LHWs for case finding presented as a facilitator but lack of funding mechanism puts a question on the program's continuity (85). This uncertainty reduced effectiveness in finding missing TB cases amongst pharmacies, demotivated employees and resulted in a worker's resignation in Gujrat (89).

10.5. Demand Side Factors affecting access to TB diagnostic services:

10.5.1. Ability to perceive:

The way individuals perceive severity of TB impacts their decisions to access diagnostic services (92).

Health Literacy has been reported as a barrier in 9 studies. Individuals with no formal education are more prone to TB infection which also serves as an indicator for low SES (43,69,71,78,84,87,93). Low SES is characterized by factors such as poor *living conditions*, overcrowding, and inadequate nutrition which increases the risk of TB infection. A 2017 study in Pakistan found that among 572 TB patients, (53% males and 47% female), half of the study population were illiterate 51% (n = 289), and the majority 64% (n = 365) had no source of *income*. These findings are consistent with a studies conducted in Karachi (43,73). Higher proportion of illiteracy is observed amongst females all over the country. Education levels are positively correlated with awareness of TB. Though women had better symptom and transmission awareness, in qualitative results majority said they would consult their husbands as the first contact while for men, 167 amongst 263 said they would consult their doctor first (71). This shows despite more awareness, traditional gender roles influence women's healthcare-seeking behavior and their reliance on their spouses for health-related guidance.

Health Beliefs: As an initial approach, individuals prefer traditional remedies such as utilizing herbs, self-medication or seeking care from traditional healer (72,87). Across Pakistan, 85% of the total patients accessing health services, initially sought healthcare in the private sector including formal providers and informal providers like pharmacists, traditional healers. Notably, a higher tendency for seeking healthcare from informal providers was observed in Baluchistan, KPK, and Sindh (68). This also plays a role in missing potential TB cases as traditional healers do not use sputum microscopy for diagnosis of TB (90). Health beliefs are shaped by the information and transparency of the services especially in rural areas of Sindh and KPK, where literacy rate is low. The inadequate NTP system led to misinformation myths about TB, resulting in social stigma and fear of exclusion from society. This reduces their ability to seek timely diagnosis or disclose their status (69,71).

Trust and Expectations: In 19 districts of Pakistan, 71% of 572 TB patients preferred private healthcare facilities including traditional healers due to positive reputation of providers and satisfactory past experiences, while only 29% accessed public facilities. Similar results were found in urban cities. (43,69,73). Majority of the patients also trusted their private provider with confidentiality concerns (73).

10.5.2. Ability to seek:

Personal and Social Values: Use of bribery to access Tb diagnostic services was observed in rural Sindh in 2020 amongst men. Such social practices worsen the existing gender disparities within the community (72). TB has stigma and discrimination associated with it and the fear of being socially excluded often leads individuals to conceal their status or not seek care leading to increased transmission (57,71,84). In KPK, most people reported not changing their behavior towards a TB patient in quantitative analysis, but qualitative interviews highlighted the fear of exclusion which aligned with

findings of another study conducted at KPK (71). Results show stigma is negatively correlated with level of education (71).

Gender: Stigma disproportionately affects women, as TB diagnosis hinders their marriage prospects and causes family embarrassment, leading to reluctance in seeking diagnostic services (57,71,82,94). Women in Pakistan are overburdened by social liabilities and cultural restrictions, which hinders them from accessing diagnosis and *screening* services timely (72,82). Men are also reported to delay health seeking due to busy work schedules and lack of time to travel and access diagnostic services as discussed under *approachability*.

Results show varying TB prevalence: 3 reveal higher prevalence in women, 1 in men, and 1 shows no significant gender difference. In Karachi, the prevalence of active TB was found to be higher in women from 2018-2019, with a prevalence ratio of 1.4 (95% CI 1.1 to 1.7) (82). From 2022-2023, in FATA, among 200 individuals, 34% tested positive for TB, with higher prevalence observed in females (38.09%) compared to males (31.03%) (93). Similarly in KPK, prevalence of TB was higher in women 50.5% (n = 281) than men 49.5% (n=275) from 2015-2016 (94). On the contrary, a case-control study with 3999 participants, conducted in Rawalpindi in 2019, indicated that females are twice as likely to develop TB compared to males (OR:2.065, CI 0.954–0.968) but prevalence of TB was higher (60%) in men (95). However in Punjab, no difference was observed in the prevalence amongst men and women in 2011 and 2017 (84,89). The differences in TB prevalence between genders in different regions of Pakistan can be influenced by various factors, including gender-specific health-seeking behaviors, socio-cultural norms, access to healthcare, living conditions, underlying health conditions, barriers in accessing healthcare. Further research is needed to understand the underlying reasons behind these disparities. Another study on IDPs between 2019-2020 revealed that female exhibit 2.42 times higher odds of experiencing diagnostic delay compared to males (87).

Autonomy: In rural Sindh, women's autonomy and *ability to seek* TB diagnostic services were generally limited, except in cases where the husband was physically disabled (72).

10.5.3. Ability to reach:

Living environments: Access to healthcare is unevenly distributed, as a significant proportion of the population, around 62%, lives in rural areas where healthcare services are scarce, which has been identified a barrier to accessing TB diagnostic services (68,84). The average household size among TB patients in urban cities and rural districts was reported to be 6.5 individuals, who exhibited lack of awareness regarding transmission of TB (43,69,78,84). Another study supports this finding by concluding that prevalence of TB is higher in urban dwellers than rural (93). This can be as urban areas often have higher population densities, resulting in overcrowded residencies which is a risk factor for TB (87). Individuals residing in low-income neighborhoods are disproportionately affected by overcrowding and malnutrition, making them more susceptible to developing TB which also affects their *ability to pay* when accessing services (69,76,95). Literature indicates that poor *living conditions* and overcrowding of prisoners also contribute to the transmission of highly resistant strains of TB in the wider community (69).

Transport: A notable disparity is observed in mean transportation costs between males (M = 160, SD = 267)⁸ and females (M = 467, SD = 1526). The p value of 0.001 indicates a significant difference and suggests that females may face more transportation challenges in accessing diagnostic facilities (73). This can be explained by the cultural restrictions, additional household responsibilities, and financial dependency on men (72).

Mobility: The responsibilities of household chores prevent women from resting or traveling to seek healthcare. Women often require permission and accompaniment from a male partner or household member to travel, which is not always granted. Additionally, women may face financial constraints that hinder their ability to afford the necessary journey for seeking care (57,72,82).

⁸ M= mean
SD= Standard Deviation

Social Support: In south Punjab, 93% of 300 TB patients lacked societal motivation and support from governments and NGOs, indicating limited social support (84).

10.5.4. Ability to pay:

Income: Data analysis revealed that the majority of patients had a low *income* and faced financial constraints as a key barrier when accessing diagnostic services which further pushed their families into poverty (43,76,84,93,95). Sindh province's highest TB prevalence rate (454 per 100,000) coupled with 67.3% of the population living below the poverty line likely leads to low utilization of TB diagnostic services due to financial barriers (72). A cross-sectional study carried out in Karachi, involving 4 public health facilities, found that among 516 participants, 59% used their *income*, 17.2% tapped into their cash savings, 4.7% borrowed money from their social networks, and 2.9% sold their *assets* to afford the expenses associated with accessing TB care. It is likely that these figures underestimate the financial burden faced by individuals seeking TB care when extrapolated to the entire country, as conditions are typically more challenging in rural areas compared to urban areas (43). Unemployment is another consistent finding that hinders patients from accessing diagnostic services (84).

Individuals have concerns about *direct costs* when they uptake GP referral for diagnostic purposes, as GPs are permitted to charge for consultation and examination. As a result, fewer patients access diagnostic services (89).

In a 2017 cross sectional study, 271 female TB patients, 82% were housewives, and 66% expressed their financial dependency on male members of the family which impacts their *autonomy, mobility* and *empowerment* negatively (73).

Health Insurance: Access to diagnostic services is impacted by social status and preferential treatment, leading to a decrease in the effectiveness of social protection schemes and give rise to inequities (72). In South Punjab there is a lack of effective health insurance government and NGOs which further deteriorates individual's *ability to pay* (84).

No relevant data was found on *social capital*.

10.5.5. Ability to engage:

Empowerment: Women often have less *autonomy* and may be obligated to have an escort when accessing diagnostic services, especially in rural areas (57,71,72). Girls faced neglect in TB diagnosis and were deemed unworthy of healthcare expenses, as they were expected to leave the family after marriage, unlike boys who were seen as future financial supporters (72).

Information: Despite women having higher rates of chest X-ray abnormalities, they were less likely to have their sputum tested (82). This can be due to lack of adequate instructions on expectoration and sputum collection provided by staff.

No relevant data was found on *adherence*.

11. Chapter 4: Discussion

The 29 studies analyzed in results from 2013-2023 not only reveal significant factors affecting access to TB diagnostic services but also demonstrate how these factors are interconnected and influence each other. Most frequently mentioned barriers, a total of 76 times, stem from the demand side. Prominent ones being low health literacy, low income, high informal health-seeking behavior, stigmatization of TB, patriarchal culture, gender inequities, perceived low quality of public services, preference for private providers. Nevertheless, supply side barriers are also mentioned 66 times. The most common ones include insufficient information provision, gender-insensitive facilities, low female representation in the health workforce, limited access in rural areas, non-adherence to NTP guidelines by private providers, inadequate knowledge among healthcare providers, and weak referral and coordination within the health system.

In Pakistan, the private sector, comprising formal healthcare providers and informal ones like pharmacists and traditional healers, serves as the initial point of contact for 85% of patients seeking health services (68). This behavior is influenced by demand side findings of lack of TB awareness, stigma and perceived low quality of services offered by public providers. Simultaneously supply-side factors such as lack of tailored information, inadequate transparency, limited media use to spread awareness, and discriminatory attitude health workers in public facilities (69,71,73) Additionally, inadequate political commitment also leads to a lack of transparency regarding diagnostic TB services, affecting the public's trust in public facilities (69,70,72,73). These issues lead to misinformation and myths about TB, resulting in social stigma and fear of exclusion from society, thus reducing the individual's ability to seek timely diagnosis (69,71). This finding aligns with a systematic review conducted in high TB burden countries, which identifies discriminatory attitude of provider, stigma and patient's mistrust as barriers that hinders diagnosis (96). Stigma is also identified by the WHO as the primary factor influencing the delay in the diagnosis of TB (97). Similar to previous research done in India, Bangladesh, Malawi and Colombia, my results reveal the persistence of TB-related stigma in society acts as a barrier to timely diagnosis (98,99). Fear of discrimination from society and the negative attitude of healthcare professionals discourage individuals from accessing services in a timely manner. Delayed diagnosis contributes to the transmission of the disease to healthy individuals within their immediate surroundings. Given the average household size in Pakistan is 6.5 individuals per household, this is concerning (43,69,78,84). The situation is worse off for women of Pakistan as they are disproportionately affected by presence of TB stigma as it reduces their probability of getting married and brings perceived shame to the family (57,71,82,94). This highlights the importance of targeted awareness campaigns, education programs, and improved communication in a culturally appropriate manner to address gaps in health literacy and beliefs and equip individuals to make informed decisions about accessing TB diagnostic services.

As important as provision of information is, comparative findings from LMICs with high TB burden, such as Zimbabwe, indicate that health promotion alone does not boost TB case detection. It should be combined with house-to-house screening and outreach clinics for better results (100). My results also mention outreach and screening as significant facilitators in finding missing people with TB, but PCF remains the standard approach in Pakistan. However, a study conducted in India revealed that the PCF approach works if patients have sufficient awareness about TB and know where to seek diagnostic care, but majority of TB patients demonstrated limited knowledge and awareness about TB pre-diagnosis (98). These findings are consistent with my results, highlighting the lack of patient knowledge and awareness as a significant barrier contributing to delayed TB diagnosis in Pakistan. Moreover, the low participation of women in TB screening programs, is a concerning finding (82). Addressing this gender imbalance and ensuring equitable access to screening services for all individuals is crucial to improve TB detection. This can be done by recruiting more female health workers and conducting separate screenings for men and women considering the cultural and societal norms. The findings regarding ECS and the higher detection rate of men (76) highlight the importance of conducting screening programs at easily accessible locations with extended opening hours. This is particularly crucial to accommodate men who are often engaged in work as the primary earners for their families. GP clinics and pharmacies have been identified as suitable options due to their long opening hours and accessible locations (89).

The preference for private facilities and providers in both rural and urban Pakistan can be attributed to several factors. Firstly, private providers have gained trust among the population, leading individuals to choose them for healthcare services (73). Additionally, private facilities often offer the advantage of being closer to people's residences, limited waiting times, longer consultation hours, and more respectful behavior from providers and staff (72,73). However, the reasons for choosing private provider might vary provincially (72,73). It was highlighted in Sindh, people prefer private providers due to non-availability of staff and supplies in public sector compared to KPK and Baluchistan where public facilities were relatively more accessed (88). It is unclear whether the reason for accessing public health facilities in the later mentioned provinces is due to the availability of staff or supplies in the public sector, or merely because individuals are unable to afford private services. The reliance on private providers for healthcare services can affect access to TB diagnostic services. As results show, despite implementation of PPM, private providers are observed to lack the willingness to report cases to the NTP, and often lack the essential diagnostic equipment and up to date knowledge for accurate diagnosis (34,68,90). Furthermore, private providers are seen to over rely on clinical symptoms and X-rays instead of sputum microscopy and GeneXpert testing, potentially resulting in missed TB cases which results in transmission of the disease (15,43,57,72,77,79,83,85,86,89,90). This highlights the need for stronger engagement of the private sector with proper NTP training. Previously there were no laws mandating TB notification (15), now Sindh, Punjab, and KPK require mandatory TB notification, and Baluchistan is in the process of implementing it (101). However, the mere existence of these laws does not guarantee that healthcare providers will be motivated to notify more TB cases. More research needs to be done on the providers behaviors surrounding rationale for testing and notification.

While the private sector in Pakistan has its flaws, the inefficiencies and inadequacies of the public sector also serve as barriers to accessing TB diagnostic services. My results highlight the lack of diagnostic capacity in public hospitals as only 48% of 980 of public facilities are equipped with microscopy services, amongst which Punjab exhibits an interesting paradox of having the highest diagnostic coverage within public facilities, while simultaneously having the lowest utilization of these facilities (68). This could be due to perceived quality issues, limited accessibility, preference for private providers, awareness gap, stigma, and perceived cost. Further research is needed to explore this area. Moreover, public healthcare facilities are underequipped and overcrowded, leading to a lack of attentiveness and bias towards patients from a higher SES, which discourages majority of the individuals from accessing them (84). Insufficient diagnostic infrastructure is possibly due to less domestic prioritization of TB when allocating funds, highlighting the need for more funding (42,70) and perhaps better advocacy within the government. Another interesting finding is the practice of bribery to access diagnostic services in public facilities (72). Such social practices not only decrease ability to seek diagnosis for less advantaged but also further decrease trust and exacerbate inequities which will be discussed shortly. The inadequate representation of females in the health workforce poses a barrier for women, particularly in rural Pakistan, in accessing TB diagnostic services (83). There is a need for increased focus on ensuring an equitable distribution of the workforce, considering cultural restrictions, to accommodate more women in healthcare facilities.

Geographic location also emerges as a significant barrier to accessing TB diagnostic services, particularly in rural areas. The distance to the nearest healthcare facility poses challenges for individuals in accessing TB diagnostic services as there is reported absence of diagnostic facilities and doctors in villages with limited transportation options (72,85,87). Financial constraints, including low income (78) and limited access to comprehensive health insurance (43,84), further compound the issue as patients often struggle to afford consultation fees, depleting their savings or resorting to borrowing or selling assets (43). This highlights the need for affordable transportation options and improved payment schemes for patients seeking care to facilitate access to diagnostic services. Integrating TB screenings at less stigmatized locations like shops and barbershops can help detect more cases among men. For women, integration into fertility clinics or conducting house-to-house screenings by LHWs can be considered as was done in Sindh (77).

My results further reveal regional variations in TB prevalence based on gender. In FATA, KPK, and Karachi, women have a higher prevalence of TB, while in Rawalpindi, men have a higher prevalence, and in South Punjab, no significant difference was observed (82,84,89,93–95). However, only the

findings from Rawalpindi align with the WHO's Global TB Report (page 13), showing that 56.5% of all TB cases were among adult men, while adult women accounted for 32.5% of cases, emphasizing the global trend of higher TB prevalence among men compared to women (7). The deviations from global trends in TB prevalence could be a result of varying study methods, data collection techniques, and the characteristics of the specific populations studied. Additionally, cultural, and traditional factors contribute to the gender disparities, where male dominance and negative attitudes towards women accessing diagnostic facilities lead to an increased disease burden for women (69). Furthermore, these provinces are not developed socioeconomically, hence there are challenges related to women empowerment, education and mobility leading to delayed diagnosis hence higher burden of TB (69,102). However, further research is required to comprehensively explore the reasons behind these prevalence variations. Nevertheless, being aware of these variations is crucial to effectively address the specific diagnostic needs of different communities and detect more TB cases.

Another consistent finding was that women are two times more likely to experience diagnostic delay than men. This can be attributed to the barriers such as patriarchal norms, stigma and discrimination, gendered roles and responsibilities, lack of autonomy, lack of financial dependence, lack of gender sensitive facilities, long distances to health facilities and mobility restrictions (57,69,72,73,76,82,84,87,93–95). Furthermore, gender biases contribute to the neglect of women's healthcare needs, with resources and expenses prioritized for men who are seen as financial supporters of the family (72). This is important because if women face barriers in getting diagnosis, it can lead to an increased transmission in the community as they are caregivers of the family. Delayed diagnosis also results in increased healthcare costs, and as my results show that, on average, women incur two times higher transportation expenses compared to men (73). This could be due to limited mobility options and the unreliability of public transport, leading women to choose private transport, which is scarce and costlier (72).

Interestingly, a higher proportion of women were notified through the PPM approach, while men were predominantly notified via the non-PPM approach (88). Dissecting this would potentially mean more women were diagnosed by PPM due to various factors. For instance, they may access private providers more to overcome above mentioned barriers. Moreover, private providers might be more geographically accessible or have a higher representation of female staff. However, to fully understand these dynamics, further research is required to explore this area in-depth.

Another important barrier limiting women's ability to engage is the lack of tailored information provision. Despite women showing higher rates of chest X-ray abnormalities, insufficient instructions on sputum expectoration results in missed opportunities for accurate TB diagnosis (82). It is possible that there might be a difference in how healthcare staff engages and communicates with females compared to males when providing instructions for expectorating sputum. Another contributing factor could be the higher illiteracy rates among women, which may lead to difficulties in understanding the instructions given by healthcare staff or in a language that's not their mother tongue. To address this, using visual aids like diagrams can effectively overcome literacy barriers and improve understanding of medical instructions.

Despite being less frequently mentioned, some facilitators have a positive impact on TB diagnostic access. Limited but present awareness about TB and the understanding that it is curable contribute to reducing stigma in society (72). On World TB Days, the NTP arranges press briefings, sports events, and uses media to raise awareness about TB. Illuminating prominent buildings and organizing rallies further promote TB awareness (34). The motivation of LHWs, supplementation of ACF through outreach and screening activities, along with limited yet positive outcomes from PPM approaches, demonstrates that when efforts are executed effectively, they can result in the identification of more individuals with TB. Moreover, healthcare providers' friendly and respectful attitudes enhance the acceptability of care and help combat the myths and stigma surrounding TB, making it a more acceptable disease.

11.1. Limitations & Strengths:

The thesis has some limitations that should be acknowledged. The exclusion of studies focusing on TB patients with comorbidities, childhood TB, and specific key populations limits the analysis of full spectrum of factors influencing case detection rates, potentially missing important insights related to these specific groups. Secondly, the search included English language papers from 2013, which might have excluded relevant studies in other languages or from earlier years. Some included studies might have smaller sample sizes affecting external validity of the results. Furthermore, there was a scarcity of recent studies, potentially leading to exclusion of current developments done to enhance case finding. Lastly, limited information available on the diagnostic capacity of private facilities might have compromised the analysis. However, the unique and valuable aspect of this thesis lies in the application of the Levesque framework to explore TB diagnostic services access. This approach allows for an in-depth understanding of barriers and facilitators from both supply and demand sides, an approach not previously undertaken in a study on evaluation access to TB diagnosis in Pakistan. Furthermore, it utilizes diverse study designs from various locations within Pakistan that provide local perspectives on the topic.

11.2. Evaluation of Levesque Framework:

The Levesque framework proved valuable in guiding my research systematically, even though I couldn't find it being utilized in analyzing access to TB detection services in Pakistan's context before. Breaking down themes and subthemes and constructing a table helped me map the vast literature effectively. However, I encountered some ambiguities when results overlapped across multiple themes, leading to challenges in compiling and organizing results without becoming repetitive. For instance, in low SES provinces, concerns regarding women empowerment, mobility, and education, mentioned *gender*, *health literacy*, *transport*, *empowerment*, and *income* simultaneously. Secondly, the framework did not explicitly consider age as a factor thus overlooking the unique access barriers and facilitators faced by different age groups. As abilities of individuals vary with *gender* and *income*, age also intersects with these dimensions impacting one's ability and agency to access services. Nevertheless, the framework still served my specific objectives well. Notably, results revealed the importance of exploring demand side factors, which are often less discussed compared to supply side factors.

It also makes one wonder how diverse factors intertwine, such as *availability and accommodation*, *affordability*, and *ability to pay*. This realization led me to understand that identifying problems and planning interventions is not a linear process, mirroring the intricacies of actual access to healthcare. As my mentor wisely puts it, life is not merely a two-by-two table. By acknowledging the interplay of various factors and considering demand side elements, it enhanced the depth of my research. This framework has the potential to contribute significantly to future studies exploring access to TB detection services.

12. Chapter 5: Conclusion

Despite intensified efforts to combat TB and improve case detection rates by identifying more undiagnosed individuals, there are still several poorly explored areas in Pakistan. The diagnostic capacity of the private sector remains inadequately quantified, and limited studies explore the perspectives of public providers regarding their mentioned discriminatory attitudes. It is still unclear if they lack motivation at work or if it is merely the community's perception. There is lack of concrete evidence explaining why fewer men are identified through PCF and why women, despite having higher chest X-ray abnormalities, are less likely to undergo sputum testing, and why private providers despite being part of PPM approach fail to contribute to their full potential.

These gaps in research could provide valuable insights into the reasons behind the current shortcomings in meeting the TB diagnostic needs of the Pakistani population. Notably, access barriers are significantly influenced by demand side issues, such as poor health literacy, low formal health-seeking behavior, cultural norms limiting women's agency in seeking diagnosis, and financial constraints. Supply side flaws also play a critical role, including insufficient information provision, lack of gender sensitive facilities, questionable service quality from private providers, inadequate public facilities, and weaknesses in the health systems such as poor coordination between service providers and NTP, along with the absence of a mechanism for sputum transportation, exacerbate the gaps in services and disrupt the continuity and delivery of appropriate care.

The results of this thesis accentuate the importance of TB awareness and the need to address stigma in society. Empowering women in community and increasing their representation in the health workforce, as well as fostering empathy among healthcare providers, can have positive implications beyond TB for other stigmatized diseases. By utilizing supply side facilitators like health promotion, enhanced linkages between providers and NTP, and the establishment of inclusive spaces, investing more in TB along with demand side facilitators such as building trust in public services, we can move closer to achieving equitable and accessible TB diagnostic services.

13. Chapter 6: Recommendations

13.1. For MoH:

1) Provision of Awareness and Mass Media Campaigns:

A public awareness campaign through local radio channels, newspapers, and television as public service announcements can be launched to spread awareness about TB and free quality diagnostic services offered at public facilities. The key message should emphasize the importance of timely diagnosis while simultaneously debunking myths about TB to reduce stigma and clear misconceptions. Engaging religious and community leaders to support the campaign can build trust and acceptance of services. Community councils can be utilized to organize workshops and seminars to engage the community. Activities should also aim to increase public knowledge about healthcare facilities and services, promoting transparency in healthcare delivery, motivating individuals to access public services. It should involve developing informational materials such as posters, brochures, and multimedia presentations that provide accessible and culturally appropriate information which is understandable to majority of the population and will aid in utilization of public TB diagnostic facilities. Involving healthcare workers in disseminating information is crucial.

2) Community Outreach Programs:

Targeted outreach to affected communities can ensure that TB diagnostic services reach the most vulnerable and underserved populations including rural dwellers, women, elderly etc. Mobile screening vans with portable X rays with advanced Artificial Intelligence (AI) - powdered CAD and diagnostic tests can extend healthcare reach to remote areas, reducing geographical barriers and facilitating timely and convenient access. To enhance female participation in TB screening, particular attention should be given to deploying LHWs in the field. Offering segregated screening locations or timings for men and women can also encourage greater engagement in the screening process. Door-to-door screening and distributing printed flyers through outreach activities can boost tuberculosis case detection, particularly in regions with low health literacy levels in Pakistan.

3) Enhancing capacity building and fostering stronger linkages between private providers and public providers:

Creating a supportive network that facilitates communication and collaboration between private providers and NTP staff can foster a more cohesive and effective approach in enhancing TB case detection. This can be achieved by conducting NTP training for private providers, ensuring they are well-versed in NTP guidelines and protocols for TB diagnosis. Regularly conducting knowledge assessments of providers can help identify any gaps and address misconceptions, ensuring adherence to NTP guidelines. Public acknowledgment and certificates of excellence can be utilized to reward their efforts and might serve as a motivating factor, encouraging greater engagement in case detection efforts.

4) Task Shifting to Address shortage of health work force in all provinces:

Task shifting, by training and empowering community health workers, LHWs and pharmacists can significantly enhance TB case detection in Pakistan in more provinces than only Sindh. By equipping them with the necessary knowledge and skills, they can actively engage in TB screening and awareness campaigns at the grassroots level. Furthermore, their close connection with the community along with greater availability hours helps reduce stigma and improves access to healthcare, especially in underserved areas.

5) Pursue Sustainable Options by Allocating More Budget to TB:

To ensure the sustainability of the TB program, it is imperative to address the significant budget gap by allocating more resources and funding. While the Global Fund has been a major supporter, domestic funding sources need to be explored. To generate additional revenue through taxation, the introduction of a sin tax could be contemplated. The funds collected from this tax could be specifically allocated to

support the TB program, contributing to its expansion, enhancing accessibility to diagnostic services, and promoting greater awareness within communities. Recognizing that TB cannot be eradicated globally until it is eliminated in Pakistan, it is crucial to invest in it and find more people that go missing each year. This requires strong political commitment from the Ministry of Health to advocate for increased attention and funding for TB in alignment with the SDGs.

13.2. For Health Workers:

1) Providing culturally acceptable and appropriate information and services customized to meet the specific needs of the population:

This approach involves understanding the cultural norms, practices, and preferences of the community and incorporating these insights into healthcare delivery. Public healthcare providers should focus on being more attentive and less discriminatory towards patients, ensuring they receive adequate consultation time. By doing so, people can build trust in public facilities and feel more comfortable accessing free diagnostic tests. This can also alleviate the fear of OOP expenditures, as patients would be more willing to seek care at public facilities knowing they will be treated respectfully and receive the necessary attention and services at no additional cost.

2) Consider gender sensitive approach:

Healthcare providers must ensure a safe and inclusive environment that respects individuals' gender identities. This includes deploying more female healthcare providers especially in rural areas and ensuring clear communication when giving instructions. Utilization of visuals to provide a sequential guide on sputum expectoration can be considered. Being mindful of gender-related TB prevalence disparity can help identify more cases, for instance in areas where TB prevalence is high in women, targeted efforts can be done to engage them in diagnostic process.

13.3. For Policy Makers:

1) Implementing women empowerment programs, including microfinancing and vocational training:

Microfinancing initiatives tailored to meet the needs of women seeking healthcare services can play a pivotal role in enhancing their financial capacity to access diagnostic facilities. By providing small loans and financial resources, we can enable women to cover direct costs and indirect costs such as transportation. Moreover, it has potential to reduce their dependence on men and traditional patriarchal structures. Women gain autonomy and agency, can make decisions about their own lives, invest in their health without seeking permission from others. Concurrently, vocational training equips women with valuable skills that enhance their employability and open doors to various economic opportunities. Training community women to become a part of health work force can also be considered which will enhance female participation in screening. The success stories of few will create a positive ripple effect and encourage others to break free from traditional gender roles, pursue education, and actively engage in economic activities. This will not only foster gender equality but also lead to more sustainable and inclusive development, benefiting both women and society at large.

2) Enact a law that addresses the issue of bribery and preferential treatment in accessing TB diagnostic tests, ensuring equal and unbiased access for all.

From a human rights perspective, equitable access to TB diagnostic services should be guaranteed to all individuals, irrespective of their education, gender, income, SES, or area of residence. This legislation should explicitly prohibit the practice of offering bribes or granting preferential treatment based on references or SES as seen in results.

14. Annexes

14.1. Annex 1: Search terms table

	Problem		Factors			Geographical Scope Terms
	OR		TB	AND		Transparency
TB diagnostic services		Outreach	Social support		Globally	
TB case detection		Information	Direct costs		Worldwide	
TB diagnostic delay		Screening	Indirect cost		SouthAsia	
Missing TB patient		Active case finding	Opportunity costs		LMIC	
Missed TB cases		Passive case finding	Income		Punjab	
Unidentified TB cases		Ectended contcat screening	Asset		Sindh	
Burden of TB		Health literacy	Health insurance		KPK	
Prevalence of TB		Literacy	Social capital		Baluchistan	
Incidence of TB		Litrecaay rate	Loans		Rural Pakistan	
Barriers to TB diagnosis		Health beliefs	Perceived cost		Urban Pakistan	
TB case detection challenges		Health seeking behaviour	Diagnostic cost			
TB underdiagnosis		Patient's trust	Consultation fee			
Incidence of TB		Public provider	Knowledge of providers			
TB diagnostic facility		Private provider	Skill of providers			
		Caregiver support	Pharmacists			
		LHWs	Role of NGOs			
		Professional Values	nowledge of public provide			
		Norms	nowledge of private provide			
		Culture	NTP guidelines			
		Gender	Quality of sevrices			
		Personal values	Diagnostic tools			
		Social values	Adequacy			
		Autonomy	Diagnostic infrastructure			
		Agency	TB staff			
		Geographic location	Referral			
		Distance	Referral uptake			
		Hours of opening	Coordination			
	Appointment mechanism	Continuity				
	Living environment	Sustainability				
	Household size	Empowerment				
	Transport	Adherence				
	Pharmacists	Role of GPs				
	Role of NGOs	Knoweldge of patients				
		Perception of patients				

14.2. Annex 2: Characteristics of included studies

Sr No	Author	Year of Publication	Location	Study design	Study Population	Supply side factors	Demand side factors
1	Farm an Ullah Khan	2021	3 districts of KPK: Bannu, Dera Ismail Khan, Lakki Marawat.	Cross-sectional	IDPs – 391 TB patients		Characteristics associated with delay in diagnosis: female gender, travelling distance > 30km, non-formal health seeking behavior, self-medication, poor knowledge of TB (health illiteracy), old age, stigma.
2	Adeel a Khan	2020	Haripur district of KPK province	Mixed method	488 Participants including TB Patients, healthcare workers and authorities. 54% men; 46% women	TV, family members or friends were the primary source of information. Lack of information provision by doctors and LHW.	<p>Knowledge about TB Symptoms and Transmission: Education level is positively correlated with awareness of TB. Women have better knowledge of symptoms and spread.</p> <p>Knowledge about TB Services: 74% of the respondents knew TB services are free.</p> <p>Health seeking behavior: 73% of men said they would consult their doctor whereas 71% of women said they would talk to their spouse first.</p> <p>Stigmatization of TB individuals prevents them from disclosing their status.</p>
3	Razia Fatima,	2017	Balochistan, KPK, Sindh, and Punjab.	Mixed Methods	Patients seeking healthcare services across all facilities for general illnesses and relating it to the availability and	Less than 1% of private providers report TB cases to NTP. 48% of public facilities were equipped with microscopy. Merely 5.4% of patients had access to	85% of patients began care in the private sector. 61% chose formal providers, 24% preferred informal ones as entry point. Higher informal use in Balochistan, KPK, and Sindh.

					accessibility of TB diagnostic tools at different locations.	microscopy services. Private-sector facilities were better equipped for treatment rather than diagnostics.	
4	Hamid Hussain	2019	Karachi, Sindh	Case Control	129 patients. 1:1 male female Majority 15-45years. January 1, 2011 to December 31, 2012,	Comparison between incentive based ACF and PCF: high initial cost of ACF per patient, but it is more cost effective as it adds 0.02 DALYs per patient and per patient saved \$15.7 and found more TB cases.	
5	Shamaza Razzaq	2022	2 public hospitals in Karachi, Sindh	Cross-sectional	516 TB patients	High pre diagnostic (\$63.8) and diagnostic (\$24) costs. No contact screening done for 91.5% (n=472) patients.	Preferred first point of contact for TB patients: 54% accessed private providers, 36% public providers 5% dispensary 4.1% pharmacy
6	Malihana Naseer	2013	Karachi	Cross sectional	196 doctors: 100 from public hospitals, 58 from private hospitals and 38 private practitioners from different localities. From Jun-Dec 2011	Private practitioners younger than public providers. Inadequate representation of females. NTP trained professionals had better knowledge scores.	
7	Mishal S. Khan	2019	Ghotki, Sanghar and Umerkot districts of Sindh	Qualitative	20 LHW + 12 health program managers	Lack of transport facilitation for TB patients. LHW's personally paid for patient's transports to diagnostic facility and were not reimbursed unless it is a TB positive case.	High indirect costs prevent people from accessing TB diagnostic services.

						Intrinsic motivation: serving humanity, religious values.	
8	Mahboob Ul Haq	2022	Lahore, Faisalabad, Rawalpindi and Islamabad	Cross sectional	12,114 TB patients diagnosed and reported in the study districts.	More males identified through ECS than PCF. Higher proportion (88%) of bacteriologically confirmed cases in ACF	
9	Waseem Ullah,	2020	Gujrat, Lahore, and Sheikhpura district of Punjab.	Cross sectional study	presumptive TB cases presenting at community pharmacies participating in the PPM-1 boosted model between January 2017 and December 2017.	Engaging 500 community pharmacies which resulted in 3025 referrals annually for presumptive cases. No. of TB cases detected = 547	63% (n=1901) accessed GP clinics while 37% did not for unknown reasons or GP fee consultation concerns.
10	Christy A. Brahm	2018	Pakistan	Systematic Review	Practitioners in any health setting in Pakistan were included: GPs, specialist physicians, nurses, non-clinical personnel, allopathic and non-allopathic/traditional healers	7 studies indicated that less than 50% of practitioners were aware of the importance of microscopy as a primary diagnostic tool. Traditional healers have 0% usage of microscopy for TB diagnosis	
11	Aubid Allah Khan	2017	3 districts of South Punjab: Lodharan, Bahawalpur and Bahawalnagar.	Cross sectional	210 TB patients registered in provincial TB program.	Poor attitude of health workers.	Risk factors for TB: low education, poor awareness of TB, crowded living conditions, poverty, long distances to facilities, stigmatization from society.

12	Ali H. Khan	2017	Sindh	Review		Lack of private sector involvement. Government influences the NTP data. Poor NTP leads to misinformation and adds to stigma.	Tb risk factors: HIV, smoking, alcohol, illiteracy, low SES, poor living conditions.
13	Jawad Khan	2023	FATA province	Cross sectional	200 individuals accessing Bajaur Agency		Analysis showed that prevalence of TB is high in females, uneducated individuals
14	Tahira Nishtar	2022	Peshawar	Cross sectional?	26,997 individuals having high suspicion of pulmonary TB referred from the chest clinic.	Out of 2617 referred individuals only 2100 (80%) gave their sputum samples. 517 lacked referral uptake. Out of 2100, 1825 (87%) were presumptive for TB in CAD4TB only while 159 (8.7%) were positive on GeneXpert. CAD4TB has 83% sensitivity and 13% specificity.	.
15	Syed Mustafa Ali	2019	19 districts all over Pakistan	Cross sectional. Quantitative Jan 2017 – Aug 2017	572 TB patients from District TB register.	79% of the 572 patients expressed trust in their private healthcare provider regarding confidentiality.	80% of the patients contact private healthcare due to unavailability of public sector staff. Prevalence of TB higher in men (53% n=301) 66% of 271 females dependent on men of family for health costs. Females spend more on indirect costs when accessing diagnostic services. Only (58% n=175) were educated till or less than 5 th standard.

							Preferred first contact: Private providers 71% (n=407) Traditional healers 27% (n=153)
16	Shifa Salman Habib	2021	Tando Allahyar, a rural district.	Qualitative	3 groups of 36 women. 1st group: 18-25yrs 2nd group: 26-49yrs 3rd group: Community resource persons (CRPs) from the National Rural Support Programme (NRSP)	Barriers: Long travel time to healthcare facilities, and inadequate representation of female health providers, lack of facilities in rural areas, limited transport,	Barriers to accessing TB diagnostic services: lack of financial autonomy, restricted mobility, insufficient prioritization of spending on women's health. Facilitators: less stigmatization, awareness about TB and that it is curable.
17	Engage Tb		Demonstration phase (Apr 2017-Oct 2018): 3 districts of Sindh: Sanghar, Umerkot, Ghotki. Scale up phase (Jan-Sep 2019): Sanghar and Umerkot	Case control	DP: 544,717 people screened by LHWs Scale up Phase: 991,128 people screened by LHWs and 4383 people screened via mobile camps.	25% increase in number of people identified and reported. Lack of financial and transportation support which decreases referral uptake.	
18	Anwar Sheed Khan	2018	KPK	Cross sectional	737 samples of EPTB collected on basis of clinical, histopathological and radiological findings from three tertiary hospitals.	GeneXpert case detection rate: 13% (n = 95) Sensitivity: 73% Specificity: 100% LED-FM case detection rate: 7% (n=52) Sensitivity: 40% Specificity: 100% GeneXpert has two times higher case detection rates than microscopy.	Prevalence higher in men 53% (n = 390). While 47% (n = 347) were female.

19	Jacob Creswell	2014	Karachi	Cross sectional	529,447 individuals screened at 89 private clinics and a large private hospital.	<p><i>Acceptability</i> of TB screening services by consumers at private facilities and has potential to increase case detection.</p> <p>91% (n=482,498) screened at GP clinics. 9% (n=46,949) at the hospital. Highlights the role of GPs in case finding.</p>	
20	Waseem Ullah	2021	Punjab, Sindh, Baluchistan and KPK	Cross-sectional study	All TB patients notified in PPM and non-PPM executed districts.	327,002 TB patients notified from Jul 2015-Jun 2016. 25% (n=81,016) were via PPM. Out of these, 45.8% notified cases were solely from GPs.	<p>More females identified via PPM.</p> <p>Different age groups have different health seeking behavior (elderly opt for PPM but adults prefer non-PPM)</p> <p>PPM contributed least in KPK and Baluchistan.</p>
21	Shifa Salman Habib	2021	Karachi	Observational	311,732 individuals were screened at mobile camps between 1 st January 2018 and 31 st December 2019.	Cultural and societal barriers affect women disproportionately from accessing screening services.	<p>Only 22.4% (n= 69 869) females accessed camps despite high prevalence ratio (1.4).</p> <p>Females less likely to provide sputum.</p>
22	Bethan Hathehall	2019	Bangladesh, Nepal and Pakistan (Rawalpindi district)	Qualitative Study			<p>Limited autonomy of Pakistani women owing to patriarchal society as men are perceived to own household.</p> <p>Stigma around TB acts as a barrier to access diagnostic facilities. Reduces the chances of marriage for women in particular.</p>

23	Wasiq Mehmood Khan	2017	Pakistan	Qualitative	10 TB program managers (6 national level and 4 provincial level).	Facilitators: PPM Barrier: weak health systems, lack of political will, inadequate funding, lack of sustainability and Global Fund does everything,	
24	Asmat U Malik	2014	District Attock, Pakistan	Cross sectional study	48 BHU physicians: 41 males and 7 females.	Barriers: lack of skilled supervisory staff, a prioritization of performance indicators over clinical skills, and an absence of an operational referral structure, shortage of health workers at BHU level	
25	Mariam Ahmed Mujtaba	2022	Rawalpindi	Case control	2000 TB patients and 1999 controls (either visited hospital or contacts of known TB patients not presumed for TB) from two hospitals.		Risk factors for TB: low BMI, low income, female gender, diabetes, unemployment. Prevalence higher in men (60%).
26	Shahab Uddin	2018	Dir Lower Valley, KPK	Retrospective observational study	556 presumed TB patients from DHQ Timergara.		Prevalence higher in females 50.5% (n = 281) compared to males 49.5% (n = 275) 40% cases among 21-40yrs.
27	R. Fatima	2014	12 districts, Pakistan	prospective longitudinal surveillance study	Private providers in 3674 non-NTP facilities	Facilitator: 3048 presumptive TB cases identified. Barrier: Lack of adherence to NTP guidelines. Less motivation to detect cases. Only 55% of cases referred to NTP diagnostic facility.	

						Weak coordination between private providers and NTP.	
28	R. Fatima	2014	12 districts, Pakistan		All TB presumptive patients in study districts.	Barrier: Approximately 10,030 missed TB cases. Facilitator: 8346 total TB cases identified. 32% (n=2633) diagnosed in non NTP sector, 23% (n=1950) in private facilities, 3% (n=288) in private labs.	
29	Ghulam Nabi Kazi	2022	Pakistan	Systematic Review	NTP during the period 2011-2020.	Barriers: Lack of political commitment, Inadequate reporting, lack of transport mechanism, lack of private sector involvement. Facilitator: GeneXpert modules installed in labs, awareness raised on World TB Day through media, rallies and building displays.	

14.3. Annex 3: Coding of subthemes as facilitators (+) and barriers (-)

Theme	Subtheme	Code	No of studies	References	Examples
Approachability	Transparency	-	3	(69,72,73)	"NTP is controlled by the government; therefore, it has some socio-political influence. For example, would the government want to reveal all data?" (69) "Only 14 participants decided to visit PPM-enrolled PHCPs, as they were informed that TB treatment services are free of cost here." (73)
		+	1	(71)	" Awareness regarding the location of the nearest TB centre was also satisfactory." (71)
	Outreach	+	1	(78)	
	Information	-	3	(57,71,72)	" While some participants were able to identify bacteria as the cause of TB and were also knowledgeable about airborne transmission, more than half of the participants believed that TB could be caused by drinking cold drinks, eating oily foods, smoke and dust, and sexual intercourse." (72) "Furthermore, (unnecessary) advice given by some health workers and TB volunteers to abstain from food preparation, to not share eating utensils, and to limit contact with children, as reported by research participants, has a disproportionate impact on women.." (57)

		+	2	(34,73)	<p>"Currently, a doctor is a primary source to share information concerning different aspects of TB care and prevention." (73)</p> <p>"On World TB days, the program organizes special press briefings. Sports events, print and electronic media use, illumination of prominent buildings, and rallies for TB awareness purposes are also part of the ACSM strategy." (34)</p>
	Screening	+	7	(34,76–80,83)	<p>"contact screening is an effective way to mend early case detection and decrease transmission especially in low and middle income high burden countries" (83)</p> <p>" A total of 4383 people were screened for TB through digital X-ray, resulting in 158 (4%) people receiving a confirmed TB diagnosis." Case study harnessing LHW for TB</p> <p>"Our results suggest that screening at GP clinics will reach people with TB earlier in their disease course than screening at hospital OPDs." (79)</p>
		-	2	(43,79)	<p>"Contact screening of study participants' family members was not done of nearly all 472 (91.5%) participants." (43)</p> <p>given the above results and other studies showing that a large proportion of cases are missed using passive case finding" (79)</p>
Ability to perceive	Health literacy	-	9	(43,57,69,73,77,79, 84,93)	"Due to low literacy rate the patients just knew the signs and symptoms of disease, but were

					<p>unaware of different risk factors and precautions that should be adopted during the course of the treatment." (84)</p> <p>prevalence of TB is more in uneducated peoples compare to educated people." (93)</p> <p>"According to Ms Rubina, the lack of knowledge, the misconceptions around TB and the difficulties in accessing health facilities are contributing factors in the challenges faced by LHWs in their daily work." (77)</p> <p>This may reflect delays in patients seeking care at any facility until symptoms are quite advanced" (79)</p>
	Health belief	+	1	(71)	<p>"Although TB was considered to be a serious, life-threatening condition, yet respondents were convinced that it was curable. Hence, the health-seeking behaviour regarding TB can potentially be improved based on this belief (71)</p>
		-	6	(43,57,69,73,78,84)	<p>"predominance of myths and misconceptions about the disease also accounted for the emergence of non-compliance" (84)</p> <p>"The weak NTP system often results in misconceptions and false beliefs among TB patients in Pakistan, especially in rural areas of Sindh. These myths have turned TB into a social stigma." (69)</p> <p>"With TB people become weak. They have difficulties in doing their work. People say it is better to have no relations with them. (Man with TB, Pakistan)" (57)</p>

					"This could be due to informal care such as self-treatment and the practice of seeking health care from private facilities, which demand sizeable amounts of direct medical costs compared to public facilities where medical costs are minimum and more tolerable" (43)
	Trust and expectation	-	3	(43,73,79)	"diagnostic cost which might be due to the laboratory investigations from private laboratories since people tended to have low confidence on the quality of services provided by public providers as training provided for TB case management for the public providers and private providers is different." (43) "Those who preferred to visit private clinics reported 'good reputation of doctor' and 'past treatment experience' as major reasons for consulting PPM-enrolled PHCPs" (73)
		+	1	(73)	"(79%) perceived that their personal information was kept secure at the clinic, and only 1% of the participants had doubt about the security of the personal information." (73)
Acceptability	Professional Values	-	2	(72,84)	"From healthcare providers prospective, results showed that 41.7% patients complained worst behavior of physicians and health care worker" (84) "At a village level, when medicines are available, they are reportedly provided only to influential individuals, who have either a resource to offer as bribes or are connected to key resource persons at the health facility or the government." (72)
		+	3	(73,79,85)	"The majority of the participants agreed that their

					<p>doctor was respectful to them (n = 484, 84%) and listened to them whenever they had any complaints (n = 485, 85%). In addition, they also agreed that the paramedic was respectful to them." (73)</p> <p>"In urban Pakistan, systematic screening for TB at private facilities using mobile phone software and incentives for community workers is simple, acceptable to clients and providers, and can yield large numbers of previously undiagnosed TB cases." (79)</p>
	Norms	+	1	(85)	"Motivation to serve humanity and save lives by supporting TB diagnosis was frequently linked to LHW's religious values and thoughts about future rewards from God." (85)
		-	1	(72)	"Highly patriarchal societal norms were described as infusing all aspects of life" (72)
	Culture	-	1	(72)	"Social injunctions on contact between men and women inhibit women seeking care from male healthcare providers" (72)
		+	1	(77)	"LHWs played an important role in raising communities' awareness in order to reduce the stigma associated with TB and in improving community members' health-seeking behaviour." (77)
	Gender	-	2	(72,83)	"few participants suggested the idea of having female healthcare providers locally referred to as "lady doctors" at these facilities." (72)
					"Female representation was relatively low in both groups." (83)
Ability to seek	Personal or Social values	Stigma -	5	(57,71,82,84,93)	We do not disclose the disease because of community attitude as it creates eventually many difficulties for us to socialize in

					the larger family. (Female TB patient). (71)
	Culture	-	5	(57,69,72,82,95)	<p>"It must be noted that these provinces of Pakistan practice cultural and traditional limitations by male dominance and negative behavior in terms of accessing health facilities." (69)</p> <p>"The structural and cultural determinants that cause women to experience delays in accessing medical care after onset of TB symptoms in Pakistan." (82)</p>
	Gender	-	11	(57,69,72,73,76,82,84,87,93-95)	<p>"Females' tendency to delay has been attributed to their restricted socio-cultural environment in Pakistan, decision-making power, the burden of domestic work, illiteracy, and distance from health care centres." (87)</p> <p>"It must be noted that these provinces of Pakistan practice cultural and traditional limitations by male dominance and negative behavior in terms of accessing health facilities." (69)</p> <p>"Social injunctions on contact between men and women inhibit women seeking care from male healthcare providers." (72)</p> <p>"We observed a higher proportion of males identified through ECS than through PCF.. often missed by routine TB control " (76)</p>
	Autonomy	-	3	(77,87,95)	Older patients and women in this part of the world generally depend on others, so it can be challenging for them to seek medical care when necessary. (87)

					"lack access to TB services, owing to various factors including stigma, a lack of decision-making power among women and the long distances between communities and health facilities." (77)
Availability and accommodation	Geographic Location	+	3	(73,85,93)	"Survey participants also provided reasons for the selection of healthcare facility type (public or private). 'Saves time' and 'close to residence'." (73)
		-	6	(57,72,84,85,89)	"Distance to the nearest health care facility was also found to be a treatment limiting factor in 74% patients." (84) "A key barrier to health services emphasized in all focus groups was the lack of medical facilities in the village." (72)
	Accommodation	-	2	(73,82)	"the predominant staffing of mobile camps with male workers (because men are easier to recruit for fieldwork in public places) may have been another obstacle to female participation in screening." (82)
	Hours of opening	+	1	(89)	The working class in Pakistan mainly belongs to the (middle) age-group of 35–54 years who may prefer pharmacies because of easy access and long opening hours. (89)
		-	1	(72)	"There are two TB Basic Management Units for TB in the public sector, marked by frequent staff-absenteeism and limited work hours" (72)
Appointment mechanisms	-	2	(73,86)	"It is reported that the waiting time to consult a doctor was more than the waiting time to collect medicine from the clinic staff." (73)	

					"This aspect becomes especially important when frontline health workers face difficulties in diagnosing cases in PHC settings where consultations are of short duration." (86)
Ability to reach	Living environments	-	5	(43,69,78,84,87)	"Residents of low-income neighborhoods, for example, suffer from overcrowding and malnutrition. Hence, they are predisposed to developing tuberculosis." (69)
	Transport	-	3	(72,73,85)	"females spend more on transportation costs compared to males, which can potentially limit the access of females to PHCP facilities." (73) "Transportation was a major limitation as public buses were either not available or delayed." (72) "Pakistani LHW accounts of the financial burden they face when supporting transport costs for patients with TB symptoms highlight the immense challenges around physical access to health facilities in rural areas where health systems are under-resourced;" (85)
	Mobility	-	3	(57,72,82)	"The demands of household chores meant that women cannot rest or travel to seek care." (72) "Women often need the consent of male household members to travel, hence mobility restrictions could be playing a role." (82)
	Social support	-	2	(84,95)	"92.9% patients under study responded that they neither received any motivation from the society nor any support from governments and non-government organizations." (84) "This has been explained by sociocultural differences that place a lower priority on

					women's health and are not supposed to seek healthcare for themselves." (95)
Affordability	Direct costs	-	5	(43,78,79,85,89)	"Patients and their families have to arrange money to bearing high costs during pre-diagnostic phase while availing private services" (43)
		+	1	(83)	"Higher proportion of patients with atypical tuberculosis symptoms presenting to the government hospitals due to lack of diagnosis by private care providers, availability of diagnostic facilities at a cheaper cost or possible referrals by private care providers could be a possible explanation for these observed differences." (83)
	Indirect costs	+	1	(78)	Even though the ACF model was over all more expensive per patient treated; it had less out-of-pocket expenditure with fewer health facility visits and better outcomes for patients than those treated in the standard passive system (78)
		-	4	(43,72,73,85)	"During the prediagnostic phase, indirect costs shared 50% and direct medical costs shared 40.2%." (43) "LHW explained that poor patients who are referred by them for TB testing do not have enough money to reach the health facility or pay for medical tests." (85)
	Opportunity costs				
Ability to Pay	Income	-	10	(43,72,73,76,78,84,85,89,93,95)	"This is very consistent with our findings that patients in Karachi experienced half the cost prior to diagnosis and over 40% attributable to income loss" (78)

					<p>"In addition, these challenges were further exacerbated for women due to their inability to travel alone and their lack of financial autonomy" (72)</p> <p>"There were more patients in the lowest-income category and patients living in kutchra houses in the group identified through ECS than in the group identified through PCF." (76)</p>
	Assets	-	1	(43)	"this study reported the distribution of different mechanisms to bearing the cost of TB care; 59.5% spent out of pocket from their income, 27.9% cut down food expenditure, 25% stopped working due to TB, 17.2% utilized cash savings, 4.7% borrowed money from friends and extended family, 2.9% sold out their assets, and 1.2% received donations." (43)
	Social Capital				
	Health insurance	-	3	(43,72,84)	<p>"In Southern Punjab, there were no effective financial aid schemes from government or non-government organizations (NGOs) and such families were mostly supported by the kinships network (termed as Beradri in Urdu)." (84)</p> <p>"policy makers are required to imply an inclusion of social support for TB care in currently functioning social health protection "Sehat Sahulat Program", a safety net program for poor in Pakistan." (43)</p>
Appropriateness	Technical and Interpersonal quality	-	11+1 (legislation)	(15,43,57,72,77,79,83,85,86,89,90)	<p>"the quality care in affordable price rates has remained worst at public health care facilities in Pakistan." (43)</p> <p>"under-use of smear microscopy and overreliance on radiography by GPs</p>

				<p>working as a part of PPM providers in Pakistan." (89)</p> <p>"standards of care have been variable and typically inadequate, ranging from very low (protocols correctly followed by under 30% of practitioners) to moderate (protocols correctly followed by between 50–70% practitioners)." (90)</p> <p>"The percentage of people with presumptive TB referred to health facilities was comparatively low at the beginning of scale-up; this is partly explained by the fact that a large number of new LHWs were recruited who did not have previous experience of TB screening." (77)</p> <p>"Retention of Mercy Corps field staff was a challenge at the beginning of implementation, with a high turnover that disrupted implementation of activities in the first year because of the need to recruit new key staff." (77)</p> <p>or it may reflect a lack of provider attention to TB symptoms until they become severe" (79)</p> <p>"Furthermore, (unnecessary) advice given by some health workers and TB volunteers to abstain from food preparation, to not share eating utensils, and to limit contact with children, as reported by research participants, has a disproportionate impact on women and contributes to creating a dissonance between TB and the gendered roles of wife and mother." (57)</p> <p>"in addition to lack of motivation and non-availability of time required for training, are potential hindrances in</p>
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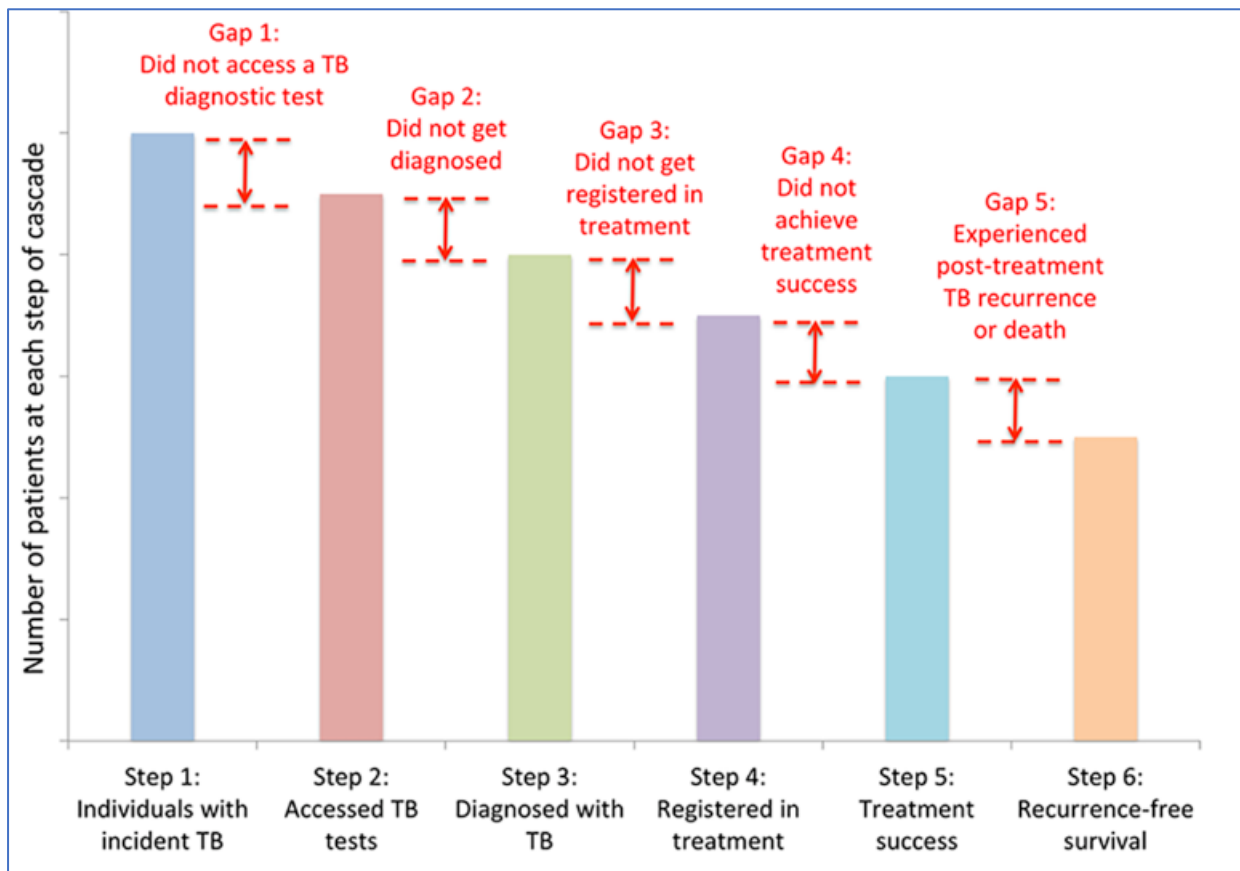
	Law	-	1	(15)	<p>practice of evidence based medicine" (83)</p> <p>"As TB is not notifiable by law in Pakistan, it is important to obtain evidence regarding the extent of missing cases from national notifications." (15)</p>
	GeneXpert	+	2	(34,91)	<p>"A total of 1,746, including 411 private sector laboratories, were testing for TB during 2019. In 2019, 327 GeneXpert laboratories with machines including 295 GX-IV and 66 GXXVI modules were installed in these laboratories for rapid detection of TB cases across the country." (34)</p> <p>"These findings support recent WHO guidelines regarding the use of GeneXpert for TB diagnosis from EPTB specimens." (91)</p>
	Adequacy	+	1	(73)	<p>"83% were satisfied with the time their doctor had spent on him/her for consultation." (73)</p>
		-	5	(34,68,72,73,86)	<p>"The existing structure of healthcare system was described as inadequate to deal with the reported health challenges at the village-level" (72)</p> <p>"Over 5,000 Basic Health Units (BHUs) are fully functional at the union council (lowest administrative unit) level in Pakistan. Only 124 have adequate infrastructure for treating TB patients along with referral linkages for specialized care." (34)</p> <p>"There is a single doctor posted at BHU level and when he is to remain away on account of all these official engagements,</p>

					who will take care of the patients?" (86)
	Coordinati on	-	8+1 (spu tum)= 9	(15,15,34,67,70,86, 88,89,103)	<p>“GPs referred only 55% of patients for sputum examination.” (89)</p> <p>"Eight managers commented that the private health sector in Pakistan is large, diverse and unregulated, making collaboration difficult."(70)</p> <p>"Ideally, as per the specified criteria established by the NTP, all were expected to contact the TB Focal Persons at their respective TB diagnostic centers, however, only two physicians contacted their designated source for advice." (86)</p> <p>“This problem needs to be resolved by strengthening the link between private health providers and the NTP" (103)</p>
	Absence of sputum transport mechanis ms	-	1	(34)	<p>"There is an absence of a standardized mechanism for transporting sputum specimens from primary level facilities to the nearest diagnostic facility or GeneXpert facility for MTB-RIF testing." (34)</p>
		+	4	(70,77,79,89)	<p>"Therefore, smooth collaboration between LHWs, LHSs, community mobilizers and district field supervisors was one of the essential elements which contributed to the success of this initiative" (77)</p> <p>“We have developed collaboration with partner organizations. If you see 270,000 TB patients [in the country], [of these] around 47,000 patients are coming from the PPM [public–private mixed interventions] contribution [FN2]” (70)</p>

	Continuity	-	3	(70,85,89)	<p>Decrease in referral provision due to unsustainable pharmacy referral program. Resulted in demotivation of the staff to make efforts. (89)</p> <p>“...we need to increase our counter part (government) financing. That will go towards sustainability, that will increase our resources because if people see and the donor sees that the public sector is also contributing, then they should be able to contribute (FN1).” (70)</p>
Ability to engage	Empowerment	-	5	(57,69,72,73,82)	<p>"While these provinces are least socio-economically developed, female empowerment, travel and education are a matter of concern" (69)</p> <p>"Participants reported that major decisions such as expenditure on housing, children’s education and healthcare were controlled by men. Income earned by women themselves was also reported to be managed by their husbands." (72)</p> <p>"our findings demonstrate that gender-related barriers—specifically, sexism which undermines the agency of women in regard to their health—weaken the impact of certain community-based TB screening campaigns in Pakistan." (82)</p> <p>"..and for young women, having less mobility and autonomy compounds the problem" (57)</p>
	Information	-	1	(82)	<p>"Other potential steps include adding female van drivers and health workers at the screening camps and rebranding of vans to include imagery and icons that appeal to women as well as men." (82)</p>

	Adherence				
	Care giver support	+	1	(71)	"71% of the respondents said that the community fully supports any TB patient, while 23% said that the patient was avoided." (71)

14.4. Annex 4: TB Care Cascade Framework:



Source: (65)

14.5. Annex 5: References

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