TUBERCULOSIS CONTROL MEASURES IN URBAN INDIA

STRENGTHENING DELIVERY OF COMPREHENSIVE
PRIMARY HEALTH SERVICES

Ranjani Gopinath, Rajesh Bhatia, Sonalini Khetrapal, Sungsup Ra, and Giridhara R. Babu

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ABSTRACT

India's National Urban Health Mission aims to improve the health status of the urban poor through equitable access to quality, essential health services, and integrating vertical health programs in its services. This study was undertaken to explore existing challenges and major gaps in implementation of the otherwise technically strong National TB Elimination Program (NTEP). Prevention of tuberculosis (TB) is a weak link in NTEP and so are the control efforts for TB among migrant populations. The socioeconomic and administrative challenges include lack of awareness and understanding of disease among communities, factors such as alcoholism causing nonadherence, continuing stigma, weak intersectoral coordination, inadequate capacities of community-level functionaries, suboptimal quality in services by private health providers, and delays in financial support for TB patients. A comprehensive strategy to improve access of quality services under NTEP must include care of the migrant population and detecting missing cases. This paper suggests actionable recommendations for TB elimination in India by 2025.

ABBREVIATIONS

ACF	active case finding
ANM	Auxiliary Nurse Midwife
ART	antiretroviral therapy
ASHA	Accredited Social Health Activist
BBMP	Bruhat Bengaluru Mahanagara Palike (Greater Bengaluru Municipal Corporation)
BPL	below poverty line
CBNAAT	cartridge-based nucleic acid amplification test
CNR	case notification rate
CSR	corporate social responsibility
DMC	designated microscopic center
DOTS	directly observed treatment, short-course
DRTB	drug-resistant TB
DSTB	drug-sensitive TB
FGD	focus group discussion
HWC	health and wellness center
ICTC	integrated counseling and testing center
IDI	in-depth interview
IEC	information, education, and communication
IPT	Isoniazid preventive therapy
JEET	Joint Effort for Elimination of TB
MAS	<i>mahila arogya samiti</i> (women's health committee)
MDRTB	multidrug-resistant TB
MOH	Ministry of Health
NACO	National AIDS Control Organization
NACP	National AIDS Control Program
NGO	nongovernment organization
NHM	National Health Mission
NTEP	National TB Elimination Program
NUHM	National Urban Health Mission
PHI	peripheral health interface
PMJAY	Pradhan Mantri Jan Arogya Yojana
SECC	Social Economic and Caste Census
THALI	Tuberculosis Health Action Learning Initiative
TB	tuberculosis
ULB	urban local body
UHC	urban community health center
UDST	universal drug susceptibility test
UPHC	urban primary health center
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

India's National Urban Health Mission (NUHM) aims to improve the health status of the urban poor by facilitating equitable access to quality, essential health services. Building on the Asian Development Bank (ADB)'s extensive experience in the urban sector, ADB extended its support to reinforce the NUHM's efforts through a results-based loan of \$300 million to the Ministry of Health and Family Welfare (MOHFW), Government of India. The loan agreement came to an end in September 2019 and a new agreement is being renewed. The unfinished agenda includes expanding the scope of services in urban facilities to include comprehensive care. As the Government of India's Comprehensive Primary Health Care initiative is implemented, integrating vertical national health programs, strengthening referral pathways, and developing and implementing standards of quality of care will need to be addressed. As a precursor to designing a new loan agreement to strengthen comprehensive primary health care in urban areas, this study to understand control of TB areas with special emphasis on migrant populations, was carried out with the aim to inform the challenges as well as areas for future investments.

If India is to eliminate tuberculosis (TB) by 2025, it is important that transmission of infection is prevented; all patients are identified; appropriate treatment regimens initiated; and treatments completed. There are gaps at each step of this process that are unique to the urban setting and are captured by this research paper. Challenges include lack of awareness, continuing stigma, lack of coordination between various urban sectors to address unique urban issues such as migration, inadequate capacities of community level functionaries and structures, and a need for focus on quality in private sector health providers.

The strategy of the National TB Elimination Program (NTEP) is to prevent, detect, treat, and build resistance to TB to ensure elimination by 2025. The study found that prevention is the weakest link, with suboptimal awareness about TB in the general population and meager understanding of the disease among patients and their families. Implementation of the communication strategy is suboptimal and does not employ available modes of communication extensively. Stigma continues to be hugely prevalent and contributes to delays in seeking care. Prevention of airborne infections is another area that will require attention to achieve prevention of the disease.

There is a disparity between assigned targets and estimated cases in the coverage areas. This dissonance will need to be addressed. The program is strong technically. Active case finding is being implemented across the cities to ensure detection of cases. While these events are generating awareness among the communities, they need to be targeted more effectively to reach the unreached. The program effectively adheres to protocols of diagnosis and treatment. There was a substantial increase in universal drug sensitivity testing (UDST) from 2018 to 2019. However, areas requiring further strengthening are ensuring prophylactic treatment for patients on antiretroviral treatment (ART) and children below 6 years of age, and contact screening. Functionaries across the states identified alcoholism as one of the common barriers to nonadherence. Financial support for TB patients is inordinately delayed. To strengthen support to the TB patients, these aspects will need to be addressed.

Involvement of private providers has markedly improved, with increases in case notifications and UDST. The new strategy for private providers will now have to focus on ensuring quality of care, adherence to standard treatment protocols, and management of comorbidities.

Collaboration between NUHM facilities and the NTEP is underway. This collaboration however is yet to leverage partnerships with urban development and welfare measures for the support of TB patients. Capacities of functionaries in urban primary health centers will need to be further strengthened for decentralizing TB care.

At present, migrants are not connected to public health facilities and are being captured in a limited manner during active case finding events. Efforts to reach migrants are limited. The NTEP will need to consider comprehensive migrant strategies, including migrant projects to identify the missing million cases.

This paper provides actionable recommendations for the consideration of the NTEP and NUHM. The study further highlights the gaps in reaching migrant populations and emphasizes the need for migrant strategies and projects to reach vulnerable populations with not only TB care but also improved access to overall health care for these communities. To achieve the goal of eliminating TB by 2025, the NTEP will have to reassess its strategies to reach the missing cases. It is hoped that this study and its recommendations can contribute to developing responsive strategies.

I. INTRODUCTION

A. ADB Support to the National Urban Health Mission, India

India's National Urban Health Mission (NUHM) aims to improve the health status of the urban poor by facilitating equitable access to quality, essential health services. Launched in January 2014, it is estimated that the NUHM will cover a population of over 220 million people, of which an estimated 77.5 million are poor and vulnerable. Through the Supporting National Urban Health Mission Program, a results-based loan of \$300 million to the Ministry of Health and Family Welfare (MOHFW), Government of India, the Asian Development Bank (ADB) extended its expertise in providing public-private partnership (PPP) advisory services to reinforce NUHM's efforts. Approved by the ADB Board on 28 May 2015, the design of the Supporting National Urban Health Mission Program was based on the NUHM Implementation Framework, and focused on a set of results and targets assessed as critical for achieving NUHM's outcome.

The program ended in September 2019. The unfinished agenda includes expanding the scope of services in urban facilities to include comprehensive care, and the institutionalization of intersector and intrasector convergence and coordination. It also includes strategies for addressing the health of migrant populations, partnerships to strengthen community processes, and expanded scope of private sector involvement. The Government of India has addressed the need for comprehensive primary health care with the launch of the Ayushman Bharat program with the twin components of Comprehensive Primary Health Care and Pradhan Mantri Jan Arogya Yojana (PMJAY). This is built on the platform of health and wellness centers. The Ayushman Bharat program is expected to provide comprehensive services (diagnostic, curative, rehabilitative, and palliative care) closer to the communities. It also includes delivering preventive and promotive services in addition to tackling determinants of ill health. As the initiative is implemented, several challenges need to be addressed. These are integrating vertical national health programs, strengthening referral pathways, and developing and implementing standards of quality of care. Additional challenges include identifying data needs, and generating and utilizing them; as well as effectively implementing behavior change interventions to prevent the burden of communicable diseases including tuberculosis (TB) and noncommunicable diseases.

B. Background of the Study

The structures of NUHM for primary health care delivery in urban areas are relatively recent. The increasing participation of urban local bodies (ULB) necessitates an understanding of the extent to which urban primary health facilities are contributing to TB control. Coordination with the National TB Elimination Program (NTEP), previously known as the Revised National Tuberculosis Control Program, and capacities to address unique urban challenges such as delivering services for migrant populations, need to be understood.

Furthermore, there is a need to assess whether NTEP and the NUHM apparatus is leveraging the institutional mechanisms established by the HIV/AIDS program in the country in mapping and reaching the migrant populations. With scientific advances, India now possesses advanced and effective interventions and technologies for diagnosis, treatment, and care of TB. The National Strategic Plan, 2017–2025 thus adopts TB elimination by 2025 as a goal capitalizing on opportunities to ensure transformational changes to TB care service delivery.

This paper details the findings of the assessment. By identifying the gaps and solutions, this research aims to contribute to the strengthening of urban TB control and thus accelerate the efforts of TB elimination by 2025.

C. Tuberculosis Situation in India

India is one of the 22 high-burden countries for TB. As per the World Health Organization's Global Tuberculosis Report 2019, the estimated incidence of TB in India is approximately 2.69 million, accounting for about a quarter of the world's TB cases. India has been implementing TB control activities for more than 50 years. Still according to NTEP, TB has killed an estimated 440,000 Indians in 2019—over 1,200 every day (NTEP 2019). India also has about half a million “missing” cases every year that are not notified, mostly remaining either undiagnosed or unaccountable, and inadequately diagnosed and treated in private providers. Table 1 provides the current burden of the disease.

Table 1: Estimates of Tuberculosis Burden in India and Rest of World, 2019

Indicator	No.	No./100,000	Global Statistics
Incidence of TB (including HIV)	2,690,000	199	10,000,000
Incidence of multidrug-resistant TB (RR)	130,000	9.6	484,000
Incidence of HIV-TB	92,000	6.8	862,000
Mortality due to TB (excluding HIV)	440,000	32	1,250,000
Mortality due to HIV-TB co-morbidity	9,700	0.72	251,000

no. = number, TB = tuberculosis.

Note: Estimated population: 1.353 million.

Source: World Health Organization. 2019. The Global Tuberculosis Report 2019.

<https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-report-2019>.

The NTEP aims to achieve 90% notification rates for all forms of TB (Directorate General of Health Services 2017), a 90% success rate for all new cases,¹ and 85% for retreatment cases. Based on the data published in the *NTEP Annual Report 2017* (data from 2016), a cascade of outcomes can be discerned. The NTEP in 2016 notified 1.82 million cases (1.44 million from public and 0.38 million from private providers) as against the estimated burden of 2.7 million cases (67.67%). The case notification rate was 138.3 as opposed to 211, the estimated incidence per 100,000. Of the 1.4 million notified by public facilities, 79.5% achieved cured, and an additional 9.5% completed the treatment, putting the treatment success at 89% (NTEP 2017). Figures 1 and 2 capture the care cascade for TB in 2016 and 2018, and give us an understanding of the challenges in controlling TB.

As can be discerned from comparing the cascade for 2016 and 2018, substantial gains have been made in capturing the missing cases. Given that urban residence is one of the key social determinants influencing the control of TB, it is essential to understand the current efforts in urban areas. The new strategy is to detect–treat–prevent–build (DTPB). The national program is making special efforts to reach the unreached through active case finding (ACF) campaigns, focusing on clinically, socially, and occupationally vulnerable populations to improve notification rates.

¹ Proportion of patients notified who either completed the treatment or achieved cure at the end of the treatment.

Figure 1: Care Cascade for Tuberculosis, 2016

TB = tuberculosis.

Source: National TB Elimination Program. 2017. *Annual Report 2017*. New Delhi: Ministry of Health.

Figure 2: Care Cascade for Tuberculosis, 2018

TB = tuberculosis.

Note: Treatment success rate from 2017 (79%) is considered, as the cohort of 2018 had not finished treatment at the time of the publication of the report.

Source: National TB Elimination Program. 2019. *Annual Report 2019*. New Delhi: Ministry of Health.

1. Challenges to Notifying and Completing Treatment

From the patient's perspective, the TB diagnostic and care pathway (Figure 3) begins with the recognition of symptoms that prompt care-seeking. Individuals may drop out of care during the diagnostic process ("lost-to-follow-up during the diagnostic period"), before initiating treatment ("pre-treatment loss-to-follow-up"), or after treatment has begun. Migration is considered one of the critical challenges to the completion of treatment. This has been compounded by the burgeoning numbers of drug-resistant TB (DRTB) patients who have to be held in treatment protocols for protracted periods. In India specifically, informal providers and retail chemists are the first point of contact and source of clinical advice for two-thirds of the patients, while the rest seek medical care directly from qualified providers. Most patients seek medical care from more than two providers, before being diagnosed as TB. Kapoor (2012) finds that female TB patients and patients with extrapulmonary TB have long mean duration between onset of symptoms to initiation of treatment (6.3 months for female patients, and 8.4 months for patients with extrapulmonary TB).

2. Migration as a Challenge to Tuberculosis Control

The 2011 India census estimated the population of India to be 1.21 billion (Office of the Registrar General and Census Commissioner 2011). Approximately 309 million are internal migrants in India, which is more than 25% of India's total population (Office of the Registrar General and Census Commissioner 2001). The National Sample Survey Office of India (NSSO) estimates around 326 million to be internal migrants, or 28.5% (NSSO 2010). The internal labor migrants are projected to be more than 10 million (nearly 6 million of intrastate migrants and 4.5 million of interstate migrants) in the country (National Commission on Rural Labor 2011). The leading source states of migration in India include Tamil Nadu, Uttar Pradesh, Uttarakhand, Andhra Pradesh, Bihar, Odisha, Madhya Pradesh, Rajasthan, Jharkhand,

and Chhattisgarh. The destination places are mainly Delhi, Punjab, Haryana, Karnataka, Gujarat, and Maharashtra (National Commission on Rural Labor 2011). There also exist main corridors of migration within the country mainly Odisha to Gujarat, Odisha to Andhra Pradesh, Rajasthan to Gujarat, Uttar Pradesh to Maharashtra, Bihar to National Capital Region Delhi, and Bihar to Haryana and Punjab (UNESCO and UNICEF 2012). The projection estimated that the internal migrants would have increased from 309 million in 2001 to 400 million in 2011 (Rajan et al. 2013).

Internal labor migrants are highly susceptible to poor and unhygienic environments, stay in compromised housing with deprived and filthy environment, are afflicted with occupational hazards, and face long-time separation from spouse and family members. Despite the wide approach of the TB control program to prevent the disease and undertake early diagnosis and treatment, its universal access among hard-to-reach populations like migrants is minimal or absent in India (Kumar 2005). Migrants are six times more likely to have TB than the general population (WHO 2001).

A study (Borhade et al. 2017) on health-seeking behavior among migrants in Nasik, Maharashtra found that only 7% migrants reported that they use government health services during their illness, while a vast 93% used private health care. Migrants reported a number of barriers to accessing health services. About 21% reported their migration status as a barrier. Nearly 14 % of migrants reported timing of their work as a deterrent to visiting public health facilities as it affects their daily wages; and 48% reported long distance of health facility from their workplace as a barrier. Almost 11% reported the language barrier as an important hindrance to access health care, as most of them were from out of Maharashtra state.

3. Participation of the Private Sector in Tuberculosis Control

Based on private drug sales data, in 2016 there was about 1.59 times patients in private providers compared to public sector health providers—approximately 2.27 million patients in total (Ministry of Health 2019). Over 80% of people with TB are first attended to in private health facilities, yet substantial diagnostic delays occur, and diagnosis and treatment are of variable quality (Satyanarayana et al. 2011). This, combined with the absence of drug quality controls, leads to drug resistance. This urgently necessitates enhanced engagement with the largely unorganized and unregulated private sector. Studies conducted since the 1990s have documented the extent to which TB is diagnosed and treated in private providers, as well as the prevalence of largely inappropriate diagnostic and treatment practices (Sachdeva, K. S., A. Kumar et al. 2012; Uplekar and Shepard 1991; Mistry, N., S. Rangan, et al. 2016; Mistry, N., E. Lobo, et al. 2017). Patients from low-income households lose several months of their income in the process of paying for inappropriate diagnostics and treatments before starting approved therapies (Pantoja et al. 2009). As a result, there are delays in diagnosis, out-of-pocket expenditure, and irrational or unsupported treatment. Patients treated by private providers are not completely notified to the NTEP, despite existing government orders to that effect. Patients cared for by private providers rarely receive sputum testing and drug-susceptibility testing. Similarly, public health services such as surveillance, adherence monitoring, contact investigation, and outcome recording rarely reach privately treated TB patients. Thus, diagnosis and treatment of TB in private providers present as both a problem and an opportunity.

D. Factors Contributing to and Compounding Tuberculosis in Urban Areas

It is assumed that marginalized people residing in urban areas have better access to health services due to their proximity to urban health facilities. However, the nascent public health delivery in urban areas and the crowding-out effect together with weak referral and outreach system severely limits access of the poor to urban health services in general and TB services in particular. The social exclusion and

lack of information and assistance at the secondary and tertiary hospitals make them unfamiliar to the modern environment of hospitals, thus restricting their access to services. Thirty-eight percent of India's slum households are in cities with 46 million-plus populations. In the Census India 2011, among top cities, slum households range from 44.1% in Greater Visakhapatnam Municipal Corporation, to 29.8% in Agra (Office of the Registrar General and Census Commissioner 2011). In the Primary Census Abstract for Slum, 2013, the urban population of India has increased with a decadal growth rate of 31%, whereas the slum population has increased at 25.1% (Office of the Registrar General and Census Commissioner 2013). The dense, growing urban environment facilitates the disease transmission across all economic strata. There is general epidemiological difference between urban and rural areas—urban areas are typically characterized by lower prevalence with higher annual risk of TB infection, while rural areas are characterized by higher prevalence and lower annual risk of TB infection. In rural areas, the NTEP has been able to develop a structure for program implementation because of the established rural health infrastructure under the general health system. In the urban areas, the structure is nascent owing to the more recent establishment of urban health delivery structures. The lack of effective partnerships with private providers and limited participation of urban local bodies in the smaller cities also adversely impact the control efforts in the urban areas. However, there have been significant movement in this area through the Global Fund project (Joint Effort for Elimination of Tuberculosis [JEET]). The Central TB Division has scaled up the learning and institutional funding mechanisms of such partnerships through domestic sources; however, the wider engagement of the private sector still remains a challenge. Tracking patients put on treatment, especially the migrant urban slum dwellers, has also remained a challenge.

The overwhelming challenge facing TB control in India remains delayed diagnosis and inadequate treatment, particularly among patients seeking care from private providers, who alone are ill-equipped to sustain their patients on prolonged, costly treatment. Patients seeking care in the public sector have a better chance of treatment; nevertheless, one third are still lost between care-seeking and successful cure. India also has a significant burden of multidrug resistant TB (MDR TB) and extensively drug-resistant or XDR-TB cases. Most of these are undetected and continue to transmit disease. Even those who are detected will have to endure long, toxic, and costly treatments only to have reduced odds of treatment success, along with a high drop-out rate and loss-to-follow-up. Although India has managed to scale up basic TB services in the public health system by treating more than 10 million TB patients under the national program, the rate of decline is too slow to meet the 2030 Sustainable Development Goals (SDG) and 2035 End TB targets (Central TB Division 2017), as well as the ambitious national target of eliminating TB by 2025.

E. Objectives of the Research

This research was designed to assess and understand the multiplicity of delivery systems as well as the continuing challenges to identify solutions that can contribute to achieving the NTEP's goal of eliminating TB by 2025. The research had three objectives:

- (i) Assess the participation and preparedness of NUHM in controlling TB in urban areas and identify areas for strengthening the participation.
- (ii) Assess the institutional and convergence mechanisms present in ULBs to control TB and recognize the need for additional capacities.
- (iii) Assess the TB services available to the migrant population at destination sites to enable an informed design for strengthening program interventions.

II. RESEARCH METHODOLOGY

This cross-sectional study was conducted by a team from the Asian Development Bank (ADB) between November 2019 and January 2020. The study used a qualitatively dominant, mixed-methods approach. This involved (i) a desk review of available published and unpublished literature; (ii) site visits to cities involving semistructured interviews with service providers, checklists for available services, and focus group discussions (FGDs); (iii) semistructured in-depth interviews at the state and city level; and (iv) quantitative analysis of data reported by the TB programs.

A. Sampling and Sample Size

Three states and two cities in each state were chosen as the study sites: Ahmedabad and Surat in Gujarat; Mumbai and Thane in Maharashtra; and Bengaluru and Belagavi in Karnataka. The study sites were purposively chosen in consultation with NTEP as these states or cities (i) were high-TB-burden states; (ii) provided a combination of large metropolitan and second-tier cities in which the NUHM has ample presence; and (iii) are destinations for migrants.

The study sampled two urban primary health care (UPHC) coverage areas and one secondary level facility linked to the UPHCs in each city to assess the participation and preparedness of NUHM (objective 1). UPHCs in each city were listed based on the slum population they cover, and the top two were selected for inclusion in the study. The TB Unit and the designated microscopy center (DMC)—if the UPHC is not a DMC—associated with the UPHC were included in the study. In Mumbai and Thane, all health facilities are managed by the ULBs. Thus, facilities that are not funded by NUHM were selected in Mumbai, but in Thane where there are no NUHM-funded facilities, none were sampled for assessing objective one. The sample of respondents for objective 1 is presented in Appendix 1 (Table A1.1).

The study sampled two primary level facilities managed by the ULBs and one secondary level facility linked to the primary facilities to assess the institutional and convergence mechanisms present in the ULBs (objective 2). The NUHM funds all urban facilities in Ahmedabad, Belagavi, and Surat, and the ULBs do not have any facilities that are delivering health care. Thus, facilities in these cities were not sampled to assess this objective. These facilities under the management of ULBs were listed based on the slum population they cover, and the top two were selected for inclusion in the study. The TB Units and DMC (if the facility is not a DMC) associated with the facility were included in the study. The sample of respondents thus covered is presented in Appendix 1 (Table A1.2).

To assess the TB services available to migrant population (objective 3), the study identified two migrant sites with support from the National AIDS Control Program and affiliated nongovernment organizations (NGOs). One workplace site and one site with informal sector migrants were identified. The nearest urban health facilities based on mapping of the area and their TB Units were included in the study. The sample of respondents thus covered is presented in Appendix 1 (Table A1.3).

No monetary compensation was provided to the respondents of this study. Tea and biscuits were served during patient focus group discussions.

B. Quantitative Approach

To keep track of the TB patients across the country, the Government of India has introduced a system called Nikshay Poshan Yojana (TB-free Nutrition Scheme). The innovative information technology (IT) application of NIKSHAY makes it possible for the grassroots-level health care providers to track every TB patient. The study used secondary data from the NIKSHAY database for 24 months (from January 2018 to December 2019). Key indicators that were analyzed are presented in Appendix 1 (Table A1.4).

C. Qualitative Approach

The qualitative fieldwork using in-depth interviews, FGDs, and checklists collected data from three larger cities and three-second tier cities (total six cities with two cities selected per state). The target for the interviews and discussions were the officials of the ULBs, state, and city NUHM and NTEP teams; health facility (primary and secondary) staff members; community-level Accredited Social Health Activists (ASHAs) and MAS or *mahila arogya samiti* (women's health committee) members; patients currently under treatment; migrants at migrant worksites; private health care providers (engaged and not engaged with NTEP); other stakeholders such as ministries and departments with schemes for migrants (National AIDS Control Program programmers, Labor Ministry representatives, ULB functionaries responsible for undertaking the National Urban Livelihood Mission, a program of the Urban Development Department); NGOs; development partners; migrant worker programmers; and workplace program managers. Before beginning fieldwork, the team field-tested the draft interview guidelines, FGD guides (see Appendix 2, Tables A2.1–A2.4), and facility visit checklist, revising them based on findings. Oral and written consent was sought from stakeholders before each interview.

D. Analysis

The analysis was carried out after each state visit to understand qualitative evidence collected, patterns, and discrepancies to help answer the evaluation questions. Upon completion of the data collection, the data was analyzed for relevance to the research questions, which allowed for triangulation of data related to a research question using different methods and then across the different research sites. These themes were used to draw conclusions and make recommendations regarding future programming.

The quantitative data (from January 2018 to December 2019) emanating from NIKSHAY was analyzed for the state and the selected cities to understand the coverage and performance of the urban facilities. For example, the analysis provides an understanding of the proportion of estimated patients being notified by the NUHM facilities, the proportion of patients completing treatment, the proportion being managed for side effects, among other parameters.

E. Quality Assurance

The FGDs and in-depth interviews were conducted by a senior public health specialist with 25 years of experience and extensive experience in qualitative methodology. Detailed notes were taken during each interview and FGD, and emerging themes were synthesized at the end of each workday as well as at the end of data collection in the city. The quantitative data downloaded as excel sheets from the NIKSHAY platform was analyzed, interpreted, and reviewed by TB experts to ensure objectivity.

F. Limitations and Threats to Validity

One of the primary limitations of the study is that it employs purposive sampling. While interpolation of findings may not apply to the entire country, it is expected to provide key insights into programmatic requirements that will enable effective TB control in urban areas. The quantitative data at the state level was captured, filtering for the reporting units from cities and towns. However, it must be noted that owing to issues pertaining to the master list of the urban facilities in the Health Management Information System of NUHM, several urban entities continue to be identified as rural. Thus, the data at the state level can be considered a slight underestimation. However, urban reporting units, especially ones at the secondary and tertiary level, as well as the private providers, cater to rural patients as well, which may lead to an overestimation of urban patients. There is a no viable method to segregate this data currently. These factors must be kept in mind while interpreting state-level data. The quality of quantitative data is also dependent on the quality of the NIKSHAY database on which the study does not have any control. As with any short-term performance study, this effort is restricted by its limited fieldwork schedule. The study is also limited by the data available to triangulate results, especially at migrant sites and from private providers. The study thus employs both quantitative and qualitative methods to meet the research objectives.

III. RESEARCH FINDINGS

A. Delivery of Tuberculosis Services

1. Case Finding

Strategy for case finding. Early identification of presumptive TB is considered an activity of the case-finding strategy. Screening and diagnosing patients with appropriate tests and strategies largely determine the response to appropriate treatment. Patients going to health facilities are expected to be screened for symptoms of TB by the health care provider. Screening for TB is expected to occur not only at the facilities, but also at every point of contact with health care professionals among populations that are clinically and socially vulnerable. In addition, NTEP employs active case finding (ACF) as a strategy to increase case notification. ACF is a provider-initiated activity and aims to detect TB cases early in targeted groups. In urban areas, the vulnerable populations are identified as those residing in slums, prisons, old age homes, refugee camps, night shelters, orphanages, destitute homes, asylums; people at constructions sites; and those identified as high-risk groups by the HIV/AIDS program. In Bengaluru, the study observed some promising practices. In addition to the sputum microscopic examination of all presumptive cases, mobilizing the local radiologists in private providers during ACF for radiological screening increased the case detection two times compared to earlier. The private sector radiologists also agreed to provide this support at a nominal cost. This initiative further facilitated the early diagnosis of several other pulmonary ailments, thus facilitating specific therapy promptly.

Source of cases. The case finding is predominantly passive from the public and private sector facilities, although all UPHCs had implemented two events of ACF in the year of 2019. A patient's pathway to seeking care is described under section B. The UPHCs are expected to find at least 3% of their

new adult outpatient load as presumptive TB cases as per the operational guidelines of NTEP. However, this is not being met by most UPHCs, indicating that patients with symptoms are not reporting to these public health facilities in the numbers expected. For example, of the 20 UPHCs in Ahmedabad, three have a referral rate of 3%, and an average referral rate of 2.23% ranging from 1.2% to 3% although each UPHC has a Medical Officer and testing facility. Each city and tuberculosis unit is given a target for notifying cases based on past performance. The WHO in its 2016 and 2018 Global Tuberculosis Report states that TB incidence was 217 (2015) and 204 (2017) per 100,000 population in Thane, Mumbai, and Ahmedabad (see Tables 2 and 3 below). However, the targets exceed the expected incidence in these cities. When the targets for private providers are taken into account, achievements for most were higher than the targets for example in the cities of Thane, Ahmedabad, Bengaluru, and Surat (see Box 1, which exemplifies ACF in Bengaluru). It must also be noted that several peri-urban and some rural patients seek diagnostic care in the city and maybe notified as an urban case. Without a clear understanding of actual and prevailing burden, it is thus difficult to assess whether a particular city or a facility is capturing all the cases. City TB Officers recommend prevalence burden-based targets.

ACF 6th Round 2019-20 (July 15-27)	Age	Count	Percentage
1. ಸ್ಕೂಲ್	13	1100	
2. ಕೃಷಿಗಲು	-	-	
3. ಉದ್ಯೋಗ ಕೇಂದ್ರ Retobali 10 centres	02	300	
4. ಕೆವೈಡ್ ಸರ್ವೇಕ್ಷಣೆ ಕಾಲೇಜುಗಳು	55	12500	
5. ಸ್ವಾಸ್ಥ್ಯ ಕೇಂದ್ರಗಳು	04	1000	
6. ಗ್ರಾ. ಪಂಚಾಯತ್‌ಗಳು	4	200	
7. NACO/HIV	-	-	
8. ವಸತಿ ಉದ್ಯೋಗ	10	1500	
9. ಮೇರಿ ಮಕ್ಕಳು	04	300	
10. ಉದ್ಯೋಗ ಕೇಂದ್ರಗಳು	05	350	
11. ಸರ್ವೇಕ್ಷಣೆ ವಸತಿಗಳು	03	200	
12. ಉದ್ಯೋಗ ಕಾಲೇಜುಗಳು	66	11593	
13. Elements	-	-	
14. High Risk	-	-	

- **Mapping of vulnerable population.** Active case finding in Karnataka (photo by Ranjani Gopinath).

Cities are conducting ACF events identifying the most vulnerable pockets; however, analysis of the yield from such events is low (Table 4). There is reported reluctance among the population in providing sputum samples during ACF. Furthermore, given that these events cover very few workplaces and are

Table 2: Notification Target Versus Achievement in Public Facilities in Six Cities, 2019

City	Population	Expected		Target	Achievement	Percent Achievement Based on		
		217 per '000	204 per '000			Target	217 per '000	204 per '000
Thane	2,011,169	4,364	4,103	4,940	4,539	92	104	111
Mumbai	13,797,712	29,941	28,147	40,950	33,819	83	113	120
Belagavi	535,300	1,162	1,092	545	322	59	30	32
B'lore Urban ^a	2,442,068	5,299	4,982	2,719	2,628	97	50	53
BBMP ^b	8,175,615	17,741	16,678	9,523	11,283	118	64	68
Ahmedabad	6,350,563	13,781	12,955	13,860	13,245	96	96	102
Surat	5,077,286	11,018	10,358	8,570	7,456	87	68	72

BBMP = Bruhat Bengaluru Mahanagara Palike.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Source: Data on Nikshay Poshan Yojana submitted by cities.

Table 3: Total Notification Target Versus Achievement (Public and Private Facilities) in Six Cities, 2019

City	Population	Expected		Total Target	Achievement	Percent Achievement Based on		
		217 per '000	204 per '000			Target	217 per '000	204 per '000
Thane	2,011,169	4,364	4,103	6,930	7,426	107	170	181
Mumbai	13,797,712	29,941	28,147	69,310	61,373	89	208	218
Belagavi	535,300	1,162	1,092	1,028	673	65	58	62
B'lore Urban ^a	2,442,068	5,299	4,982	4,690	4,887	104	92	98
BBMP ^b	8,175,615	17,741	16,678	13,705	16,680	122	94	100
Ahmedabad	6,350,563	13,781	12,955	20,500	21,383	104	155	165
Surat	5,077,286	11,018	10,358	14,210	14,622	103	133	141

BBMP = Bruhat Bengaluru Mahanagara Palike.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Source: Data on Nikshay Poshan Yojana submitted by cities.

Box 1: Improved Active Case Finding through Cooperation of Local Radiologists

In Bengaluru, mobilization of the local radiologists in the private sector during active case finding for radiological screening—in addition to the sputum microscopic examination of all presumptive cases—almost doubled case detection compared to than what has been seen in the past. The private sector radiologists also agreed to provide this support at a nominal cost. This initiative further facilitated early diagnosis of several other pulmonary ailments thus, supporting an early institution of specific therapies.

Source: Asian Development Bank.

conducting during working hours, they may be missing presumptive cases among men, migrants, and working women. Also, field-level functionaries in all cities were ensuring that the sputum sample is collected for a symptomatic person encountered in the community.

The case notification numbers from both public and private sectors for the period of January 2018 to December 2019 is presented in Figures 4 and 5.

Private sector notifications have improved across all six cities from 2018 to 2019, exceeding targets due to partnerships with patient provide support agencies, discussed in detail under section IV.

- **Sputum collection.** Accredited social health activists and auxiliary nurse midwives with sputum collection boxes (photo by Ranjani Gopinath).

Table 4: Coverage of Active Case Findings and Results, 2019

City	Population Screened	Presumptive Cases	Total Diagnosed as Tuberculosis	Put on Treatment	Diagnosed or Screened (%)
Thane	791,695	1,453	81	77	0.001
Mumbai	3,556,174	6,662	287	282	0.008
Belagavi	561,643	890	30	29	0.005
B'lore Urban ^a	765,317	4,406	345	345	0.004
BBMP ^b	2,728,481	5,876	123	115	0.004
Ahmedabad	1,929,765	7,179	73	73	0.003
Surat	1,167,239	2,571	18	18	0.001

BBMP = Bruhat Bengaluru Mahanagara Palike.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Note: Screening was carried out in two phases.

Source: Asian Development Bank.

Figure 5: Notification in Public Facilities of Six Cities Against Targeted Numbers, 2018 and 2019

BBMP = Bruhat Bengaluru Mahanagara Palike.

Source: NIKSHAY data submitted by cities.

2. Diagnosis and Treatment

Adequacy of diagnostic facility. Diagnosis and treatment protocols are being followed for all patients in all six cities. Sputum samples are tested, x-rays administered, and cartridge-based nucleic acid amplification test (CBNAAT) tests done as per the guidelines. However, there are gaps in actual implementation of these protocols owing to patient-related factors. Due to a load of cases in Mumbai, it takes 3–5 days to receive CBNAAT results. In cities such as Mumbai and Ahmedabad, the notifications are higher than the capacity of the CBNAAT machines to test samples, if universal drug susceptibility testing were to be achieved (Table 5).

Thane Municipal Corporation has installed x-ray machines in three of their UPHCs to increase accessibility to patients. Samples for CBNAAT are collected at the DMC and sent to the referral laboratory with the CBNAAT machine. However, for an x-ray, the patient has to visit the secondary or tertiary facility, which consumes resources and creates a potential for infection transmission in the crowded facility. There are challenges in collecting a sample for CBNAAT test from a patient of extrapulmonary TB. This owes to the fact that not enough tissue samples are collected by the surgeon. Despite requesting for the additional sample from fine-needle aspiration of a lymph node, samples are not available, or are inadequate for CBNAAT testing. The study did not explore accessibility to fine needle aspiration cytology services from the patients' perspective. Some laboratory technicians reported challenges with the quality of sputum received from the patients, although they counsel the patients about the correct way to expectorate. Each city is linked with an intermediate reference laboratory for line probe assay and culture and drug sensitivity tests. Partnerships have been forged with private diagnostic laboratories to offer free x-ray to patients as well as pre-evaluation tests for

Table 5: Availability of X-ray and Cartridge-Based Nucleic Acid Amplification Test Facilities

City	Population	Total Notification	X-Ray Facilities	CBNAAT Facility in Public Sector	Average Tests Done per Month	Monthly Tests per CBNAAT Site
Thane	2,011,169	7,426	6	2	900	450
Mumbai	13,797,712	61,373	35	35	10,500	300
Belagavi	535,300	952	5	1	250	250
B'lore Urban ^a	2,442,068	4,887	14	2	250	125
BBMP ^b	8,175,615	16,680	16	10	300	30
Ahmedabad	6,350,563	21,383	32	5	1576	315
Surat	5,077,286	14,622	3	4	1349	337

BBMP = Bruhat Bengaluru Mahanagara Palike, CBNAAT = cartridge-based nucleic acid amplification test.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Source: Asian Development Bank.

drug-resistant TB (DRTB) patients. While patients did not express any difficulties in accessing these centers, nonavailability of these tests under one roof potentially can lead to challenges in patient adherence and result in loss of resources for the patient (out-of-pocket expenditure and time delays). Each city has a DRTB center to diagnose and initiate the treatment for drug-resistant cases. They are staffed with chest physicians to manage adverse drug reactions as well. The DRTB centers are located within tertiary hospitals and can provide in-patient care in their TB wards. However, the adequacy of DRTB centers to manage the current burden was not assessed by the study.

Diagnosis is not adequately decentralized. Analysis of patients currently being treated at UPHCs reveals that a substantial proportion of patients were diagnosed at tertiary facilities or facilities that were not the current treating facility. For example, of the 388 patients currently on treatment in the Kosad UPHC in Surat, 169 (43.6%) had been diagnosed elsewhere. Similarly, 59.4% of patients treated at Pandesera UPHC, Surat were diagnosed elsewhere. This indicates the preference of the patient to access private care or care from a tertiary facility, before being referred to the facility closest to his or her residence. It must be noted that both UPHCs have sputum microscopic services available.

Universal drug susceptibility testing. The proportion of patients being offered UDST has increased from 2018 to 2019 in both sectors (Figure 6). UDST performance in public sector facilities increased, ranging from 17% (Surat) in 2018 to 47% (Bengaluru Urban) in 2019. Performance in private sector facilities increased, ranging from 88% Bruhat Bengaluru Mahanagara Palike (BBMP) to 218% (Surat) between 2018 and 2019. While UDST is still low in private providers in cities such as Bengaluru, Ahmedabad, and Surat, about three-quarters of the patients are being offered CBNAAT testing services.

Management of multidrug-resistant cases. Owing to a load of MDR cases in Mumbai, the ULB has forged a partnership² with the Tata Institute of Social Sciences to provide 50 DRTB counsellors. Each counsellor supports about 200 patients based on needs, even at the level of the household. Initial loss-to-follow-up (pretreatment) among these patients is between 4%–8% and is a significant challenge. Adverse drug reactions result in interruption of regimen for 1–2 months. In contrast, Two DRTB supervisors support

² The Saksham Project is supported under Global Fund grants, and Tata Institute of Social Sciences is a subrecipient under the Central TB Division. ULB is a beneficiary. Saksham supports the states of Gujarat, Karnataka, Maharashtra, and Rajasthan with DR-TB Counsellors.

Figure 6: Proportion of Patients Tested for Drug Susceptibility in Public and Private Sector Facilities in Six Cities, 2019 (%)

BBMP = Bruhat Bengaluru Mahanagara Palike, U DST = Universal Drug Susceptibility Test.

Source: NIKSHAY data submitted by cities.

all 370 MDR patients of the Belagavi district (rural plus urban). As the burden of multidrug-resistant TB (MDR TB) increases, additional support will be required by cities to support these patients (Table 6) although no other city expressed the need for additional support currently.

Table 6: Burden of Multidrug-Resistant Tuberculosis in Six Cities, 2018 and 2019

City	2018			2019		
	Total Notified	MDR TB Diagnosed	MDR Patients Undergoing Treatment in the City	Total Cases Notified	MDR Patients Undergoing Treatment in the City	Put on Treatment
Thane	4,124	637	386	4,539	637	386
Mumbai	51,785	4,989	4,969	52,423	5,215	5,171
Belagavi	428	97	88	391	122	107
B'lore Urban ^a	2,366	84	76	2,628	67	62
BBMP ^b	9,373	121	115	11,544	265	220
Ahmedabad	12,572	600	444	13,245	754	676
Surat	8,244	398	315	7,456	448	384

BBMP = Bruhat Bengaluru Mahanagara Palike, MDR TB = multidrug-resistant tuberculosis.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Source: Nikshay Poshan Yojana data submitted by cities.

Airborne infection control. Except for one UPHC in Mumbai, all UPHCs had adequately ventilated spaces to receive and meet TB patients. However, the centers have not undergone scientific assessment for determining the adequacy of infection control systems. TB patients comingle with general patients while waiting to meet the TB Health Volunteer or pharmacist. This study was not designed to assess this parameter.

Management of latent tuberculosis in key population. Children below 6 years of age, who are close contacts of a TB patient, are identified by the field staff and evaluated for active TB by the Medical Officer. After excluding active TB, the child is given Isoniazid preventive therapy (IPT). The contacts are closely monitored for TB symptoms. Cities in 2019 screened two-thirds to 92% of the contacts of TB patients, demonstrating improvements from the previous year. About three-quarters of children under the age of six were put on prophylactic therapy in the six cities, except Bengaluru urban (Figure 7). IPT is being offered to about half of the people living with HIV. However, data indicates that none of the patients on ART have been offered IPT in Thane (Figure 8). Challenges include the availability of drugs (in Belagavi) and reported side effects among patients on antiretroviral therapy.

Management of co-morbidities. Co-morbidities are being managed as per the guideline, and most TB patients are tested for HIV and diabetes mellitus. Similarly, patients on ART are being screened for TB symptoms and put on treatment. HIV status is known for nearly 90% of the patients in the public sector (Figure 8). Cities have improved in this indicator in 2019 compared to 2018. However, this proportion (patients with TB with known HIV status) ranges from 44% in Thane to 71% in Ahmedabad for patients notified by private providers. Private practitioners report that they do not want to burden their patients

with additional tests. The status has improved since the advocacy from the (patient provider support agency [PPSA]) entities to improve access to HIV testing for patients being treated in private providers. Co-infection with HIV was observed to be limited as reported by the private providers, but high prevalence of diabetes mellitus and hypertension was reported by providers (as compared to HIV) across the cities under the study. This enhances the vulnerability of the population to TB. Social issues as well as several other health issues continue to plague this program. Alcoholism is rampant among the urban poor, and causes havoc uniquely when poor quality alcohol with inadequate nutrition combines and supervene a severe infection such as tuberculosis.

Figure 9 presents the status of diabetes mellitus screening among TB patients in public and private sector facilities. In the public sector facilities, more than 90% of the patients notified in 2019 were screened for diabetes mellitus, and their status was known. Each city (except facilities under BBMP) had demonstrated an improvement in identifying the diabetic status of the patient as compared to 2018. Patients diagnosed with diabetes mellitus are being managed at the UPHC level as these facilities have adequate medicines. Improvements have been made in private providers for this indicator as compared to 2018, increasing from 10% to 85%, for example, in Belagavi. The PPSA-supported improvements in screening for co-morbidities in Ahmedabad is presented in Figure 10. Challenges remain in managing patients who consume tobacco, and very few agree to be linked to cessation therapy.

Figure 9: Screening for Diabetes among Tuberculosis Patients

BBMP = Bruhat Bengaluru Mahanagara Palike.

Source: NIKSHAY data submitted by cities.

Figure 10: Screening for HIV and Diabetes Melitus among Private Patients in Ahmedabad, 2019

BBMP = Bruhat Bengaluru Mahanagara Palike, no. = number, Q = quarter, RBS = random blood sugar.

Note: RBS done for 63% of patients and HIV testing for 57% of patients.

Source: Patient Provider Support Agency.

3. Retention in Care

Designated treatment supporters. Very few treatment supporters had been designated for the patients across the six cities (Figure 11). Since most patients reportedly prefer to receive their medication at the UPHC rather than from the ASHAs or Auxiliary Nurse Midwives (ANMs), these functionaries were not actively involved in ensuring adherence to treatment. Some ASHAs, Anganwadi Workers, and private providers who were acting as treatment supporters reported not receiving their due incentives.

Digital adherence technologies. Ahmedabad, Bengaluru, Mumbai, and Thane have piloted digital adherence mechanisms such as the 99DOTs and Medication Event Reminder Monitor or MERM System; these are not currently available in Surat and Belagavi. 99DOTs is a drug sleeve with a hidden phone number that is revealed to the patient when he or she takes medicine out. The patient is then required to give a missed call to the number that registers the adherence on the NIKSHAY platform. Functionaries reported facing a challenge with calls being captured by NIKSHAY. Patients may not call from their registered number, also leading to missed data on adherence. The Medication Event Reminder Monitor technology has been piloted in Mumbai and was not observed in any other city.

Figure 11: Proportion of Antiretroviral Therapy Patients on TB Prophylaxis in Six Cities, 2018 and 2019 (%)

ART = antiretroviral therapy, BBMP = Bruhat Bengaluru Mahanagara Palike, TB = tuberculosis.

Note: Bengaluru Urban does not have an ART center.

Source: NIKSHAY data submitted by cities.

Financial support to patients. Patients are provided Rs.500 (\$7.20) each per month toward nutritional support through direct bank transfers. This entails registering account details in the NIKSHAY platform. The platform validates accounts from only those banks that are listed as approved. This becomes a challenge for a patient who does not have an account in the authorized bank. Often, owing to their economic condition patients are unable to open accounts in another bank and maintain the minimum balance. In cities facing these challenges, limited attempts have been made to organize the opening of zero balance accounts for patients under the PM's Jan Dhan Yojana. System-related issues delay payments to patients. The first tranche of payment is received mostly during the third month of treatment, defeating the purpose of supporting the intensive phase of therapy (Figures 12 and 13).

Figure 12: Disbursement of NIKSHAY Payments, 2018

(%)

BBMP = Bruhat Bengaluru Mahanagara Palike.

Note: Data for the whole city, including patients in private hospitals.

Source: NIKSHAY data submitted by cities.

Figure 13: Disbursement of NIKSHAY Payments, 2019

(%)

BBMP = Bruhat Bengaluru Mahanagara Palike.

Note: Data for the whole city, including patients in private hospitals.

Source: NIKSHAY data submitted by cities.

Additional nutritional support for patients. The ULBs in Mumbai and Thane have raised funds under the fabric of corporate social responsibility (CSR) to provide cereals and pulses or protein mix to the patients, which has been much appreciated by the patients. Patients from other cities suggested that nutritional support, especially in the form of protein mix, should be provided by the public facilities.

Barriers to retention. Alcoholism was reported as one of the common challenges to adherence. Patients on DRTB regimens also face challenges in adhering to medication owing to side effects of the medicines. The NTEP staff members make concerted efforts to counsel these patients and support patients who have to travel outside the city for a few weeks by ensuring they have adequate medication until their return. Functionaries further seek alternate phone numbers for patients who are likely to migrate to ensure they are transferred to another facility adequately or receive medication for the days of absence. Despite these efforts, migrant patients tend to leave without informing the functionaries, and these constitute the bulk of loss-to-follow-up. The study could not garner perspectives from migrant patients who had been lost to follow up, and most retreatment patients in the FGDs had stopped taking medication because of side effects or alcoholism.

Outcome indicators for patients treated in public and private facilities (2018). The treatment success rate in public facilities ranges from 65% in Thane to 87% in Ahmedabad, whereas in private providers this ranges from 60% in Bengaluru to 87% in Ahmedabad. The loss-to-follow-up rate ranges from 2.8% in Belagavi to 5% in Surat and Bengaluru in the public facilities. This ranges from 10% in Surat to 0.5% in Bengaluru in private providers. Figures 14 and 15 depict the outcomes in public and private sector facilities in 2018. Figure 16 provides the results of all patients notified in 2018.

Figure 14: Outcome among Patient Cohort in Public Facilities, 2018

BBMP = Bruhat Bengaluru Mahanagara Palike.

Note: Data for the whole city, including patients in private hospitals.

Source: NIKSHAY data submitted by cities.

Figure 15: Outcome among Patient Cohort in Private Facilities, 2018

BBMP = Bruhat Bengaluru Mahanagara Palike.

Note: Splitting of “loss to follow-up” data in public and private hospitals are not available for Mumbai.

Source: NIKSHAY data submitted by cities.

Figure 16: Outcome among All Patients, 2018

BBMP = Bruhat Bengaluru Mahanagara Palike.

Source: NIKSHAY data submitted by cities.

4. Private Sector Participation

Partnerships for private sector engagement. All cities have partnerships in the form of a PPSA for private sector engagement. These were either being implemented under the Global Fund’s JEET project or the Thali project of the United States Agency for International Development (USAID). The focus of the PPSA activities include mapping and prioritization of private sector providers; ensuring nationwide access to WHO-approved quality TB diagnostics to patients seeking care in private providers; and enabling early, appropriate, and free treatment initiation, public health actions, and adherence support systems. The JEET program alone aims to facilitate 1.6 million notifications in 3 years with a treatment success rate of 70%.

The PPSAs employ a “hub and spoke” model for engaging private providers, linking stand-alone practitioners with larger hospitals that function as the diagnostic hub (Figure 17). The PPSA works in close coordination with the NTEP apparatus and decentralized level coordination between their treatment coordinators and the public facility’s TB Health Volunteer was observed to be reliable.

In some cities, directly observed treatment, short-course (DOTS) centers have also been established in the private hospitals with high footfall to facilitate access to the patients. Also, PPSAs in the cities coordinate with chemists and pharmacists to identify patients buying anti-tubercular medication to ensure all patients are notified. The PPSA agencies are engaging NTEP staff, heads of medical colleges, and leading doctors of the locality; as well as conducting continuing medical education events promoting microbiological confirmation, UDST, and outcome reporting among the private providers. For example, 1,615 facilities have been mapped in Ahmedabad, of which 563 (35%) are notifying. Similarly, in Surat, 25% of the mapped facilities are notifying. Figure 18 depicts the improvements in private provider participation in Ahmedabad and Surat.

Improvement in indicators. The data above clearly indicates an increase in notifications from private providers. Data further shows an increasing proportion of patients on fixed drug combinations (37% patients), testing for drug sensitivity (2.7% in 2018 to 34.15% in 2019 in Ahmedabad) and screening for co-morbidities. Similarly, UDST in private sector is 62% in Thane. However, challenges remain in the private sector management of TB. Private providers may not bring all TB patients to the hub agent's notice. Doctors report that patients are reluctant to be contacted by the PPSA functionaries. The private providers have been enlisted into advocating notification to the patients citing the availability of financial support. However, disbursement delays, as reported by almost all private providers influence the private provider's motivation to counsel the patient for contact with the PPSA functionary. Non-notifying private providers are referring patients to the public sector—mostly to the tertiary hospitals as not all have the information about the local UPHC. CBNAAT reports a turnaround time (average of 6 days); the reluctance of private providers to accept results from a sample stored over 6 days; and signatures of the Laboratory Technician instead of the Medical Officers are additional challenges.

Participation of the private providers. Interviews with private providers (24 in all) revealed varying degrees of understanding of the diagnosis and treatment guidelines despite being supported by the PPSA. While some prefer to get CBNAAT for all presumptive patients, others do not prescribe the test at all. Many were not aware that their patient's sample had been sent for CBNAAT by the PPSA functionaries. Private providers were not counselling the patient about cough hygiene and sputum disposal. However, the treatment coordinators and outreach workers of the PPSA were covering almost 97% of the patients with interpersonal communication. Good quality information material is also made available to the patients. None of the clinics visited however had any information, education, and communication (IEC) material displayed. Private providers did not have any information material available with them to share with their patients. Private providers reported referring poor patients to public health facilities and catering to out-of-city patients as well.

Future of patient provider support agencies. As notifications from the private sector increase, the focus will have to shift to quality of services, including diagnostics, treatment regimen, and management of adverse drug reactions. Furthermore, program managers find that without support from a PPSA, it may be challenging to maintain the level of engagement achieved so far. Although TB Health Volunteers are identifying private providers and engaging with them in some cities, increasing population and density of patients would mean inadequate coverage of private providers by the system.

5. Institutional Mechanisms

Coordination between NUHM and TB systems. The ULBs are leading the implementation of NUHM and NTEP in five of the six cities (except Belagavi). DMCs have been established within UPHC. This has facilitated coordination between the NTEP and NUHM staff due to the presence of a TB Health Volunteer at the UPHC level. The two programs coordinate adequately with functionaries from both programs reporting ample support. Joint TB reviews are held at various levels. The Medical Officer reviews the indicators with the TB Health Volunteer weekly and the Senior Treatment Supervisor monthly. The Medical Officer reviews the implementation with laboratory technician ANMs, and ASHAs monthly in the presence of the TB Health Volunteer. The City TB Officer reviews the Medical Officers quarterly.

Mechanisms for TB–HIV coordination. The cities in which officers have joint responsibility for TB and HIV (Thane, Belagavi) are successful in ensuring delivery of TB interventions through HIV/AIDS Targeted intervention targeted interventions projects. However, operational coordination between the ART centers and the TB staff based in the ART centers, including disagreements on who uploads the data, create challenges. In cities such as Surat, Ahmedabad, and Bengaluru, this has been made possible by strong coordination between the TB and HIV programs. Mumbai, however, faces challenges in coordination between NUHM, NTEP, and the District AIDS Control Society as reported by the HIV counterpart. The challenges include nonavailability of data on (i) HIV screening done at the UPHC and proportion sent to the integrated counseling and testing center for confirmation; (ii) proportion of presumptive patients who underwent HIV testing, (iii) proportion of patients diagnosed as TB- and HIV-reactive, (iv) request for cancer screening of female sex workers not fulfilled, (v) attempts to introduce HIV testing services in NUHM mobile vans not successful, and (vi) only 5% of patients notified by private providers are screened for HIV. Patients on ART are provided TB treatment at ART centers and not at UPHCs or DOTS centers. Thus, their Nikshay entries are made by the HIV staff. NTEP finds that data for these patients are generally incomplete and requires constant follow up and support from the NTEP staff. The new City TB Officer is resolving these challenges following feedback. Regular review meetings are held to address TB–HIV management in all cities where data is also reviewed to understand gaps in implementation. However, there is a need for institutionalized coordination mechanism that are not person-dependent.

Institutional mechanisms for convergence with urban welfare programs and other ministries not available. Despite ULBs leading the NUHM, very little convergence was observed with the urban development and welfare programs. For example, coordination with National Urban Livelihood Mission to utilize self-help groups for social mobilization, dissemination of information, and identification of migrants was missing. Similarly, few efforts were being made to link poor patients with welfare schemes from within the ULBs. Mapping efforts of the National Urban Livelihood Mission to identify street dwellers is also not leveraged. While an effort to coordinate with industrial corporations was observed in Ahmedabad, structured attempts to partner with the organized sector was largely missing. Cities have not reached out to labor departments to identify avenues of mapping migrants. Mumbai and Thane have, however, partnered with the corporate sector and utilized CSR funds to provide nutritional support to patients, as mentioned earlier.

Partnerships. ULBs have forged partnerships for private sector engagement, conducting IEC campaigns, facilitating pretreatment evaluation of DRTB patients and making x-ray services accessible as discussed in previous sections.

6. Advocacy, Communication, and Social Mobilization

Strategy for advocacy, communication, and social mobilization. The existing strategies in sampled cities include sensitization of elected representatives, mass media campaign (led by the actor Amitabh Bachchan), dissemination of key messages during ACF events, informational posters in the facility, and interpersonal communication with the patients and their families. While mapping of the vulnerable population is done as a precursor to the ACF event, as observed by the study team, this is not capturing all pockets of vulnerability. The ACF micro-plan includes vulnerabilities identified by the UPHC community-level functionaries; however, these are inadequate to identify migrant workers. The messages during ACF campaigns are geared toward case finding and do not focus on cough hygiene and safe sputum disposal, critical to preventing infection transmission. Posters and other messages are commonly displayed in areas visited by the TB patient (by the NTEP staff) and are not accessible to other patients. Ahmedabad has recruited the support of local NGOs to conduct IEC campaigns to include TB messages. No other city had such a mechanism.

Availability and quality of communication material. Most IEC materials reviewed by the study (posters and leaflets) focus on case finding (symptoms of TB) and do not address the availability of free diagnostics, free treatment, financial support, or preventive measures (Figure 19). The exception is Ahmedabad, where a brochure with relevant information has been developed. However, these

Figure 19: Communication Materials Developed by Partners

Source: State TB Office Karnataka.

are not available at the UPHCs. The reviewed material is verbose and has few pictures to attract the attention of any patient visiting the health center. Nonlocal language material was not available in any center. It cannot be used for migrants from Andhra Pradesh in Gujarat or from Bihar in Karnataka. None of the cities reported the development of social media messages, such as short video clips on preventive measures that could be disseminated widely through mobile technology.

Furthermore, the UPHCs did not have adequate leaflets that could be shared with the patients and their families. They merely had leftover material from the ACF campaigns. Despite support from PPSAs, most private practitioners did not display any TB material in their clinic, nor did they provide informational material to patients.

Communication with patients and their families. TB Health Volunteers provide patient and family counselling without the support of any interpersonal communication tools. No additional information material is provided to the patient to ensure that key messages discussed during the counselling session are not forgotten. Key messages on cough hygiene focus on what not to do, rather than what to do, as discussed in the earlier section. Patients are advised about nutritious diets; however, the recall of what constitutes a nutritious diet is very low among the patients. The study team came across material developed by agencies such as PATH and USAID with clear and pictorial messages on cough hygiene and diet advice (Figure 20). Still, these have not been incorporated by the NTEP in the cities visited. The dismal awareness among the patients and community members (discussed in ensuing sections) about the disease and prevention of its transmission are indicative of weak IEC implementation.

Community mobilization is limited. Although ACF campaigns are considered efforts to mobilize communities and generate awareness about the disease, they are perhaps limited to disseminating information about symptoms of TB. While the study team did not witness the campaign itself, review of material disseminated during the campaigns indicates as such. The availability of MAS has not been leveraged adequately to generate awareness about the disease and facilitate destigmatization. This is also because the implementation of MAS processes is weak. MAS who had been trained, empowered, and provided untied grants regularly in Ahmedabad, were participating in TB control activities. However, most MAS members (who are community members) displayed very little awareness about the prevention of transmission and available services. Very few examples of using a cured TB patient as UPHCs cited a “champion”.

Figure 20: Communication Material Developed by Partners

Source: State TB Office Karnataka.

Furthermore, only one UPHC (in Ahmedabad) had leveraged the self-help groups of the National Urban Livelihood Mission for disseminating TB messages. Ahmedabad is also the only city which reported a plan to implement dissemination events using folk theatre and other local media. Advocacy, communication, and social mobilization are perhaps the weakest link in the system.

7. Human Resources—Adequacy and Quality

Adequacy of human resources. Barring shortage of ANMs in Belagavi, NUHM staff composition was adequate and as per the national guidelines. NTEP has no vacancies in the cities sampled. Nonetheless, based on the growing burden of MDR patients in Mumbai and Thane and the increasing population density in cities such as Surat, City TB Officers implied a need for additional TB health volunteers to cover the city adequately.

Training status and its adequacy. All NTEP staff members had received scheduled training and were well versed with the guidelines and the NIKSHAY platform. All Medical Officers had either received training in the new NTEP guidelines, program management of drug-resistant TB, and NIKSHAY platform. Some who had missed a few of these training had the guidelines and reading material available with them. Also, the Medical Officers receive technical updates from the NTEP supervisory staff including the Senior Treatment Supervisor, Senior TB Laboratory Supervisor, and from the TB Unit Medical Officer during monthly visits or meetings. However, many younger Medical Officers lacked a thorough understanding of the new guidelines and adverse reactions experienced by the patients on drug-resistant regimens. Their familiarity with the NIKSHAY platform was also weak. Medical Officers expressed the need for additional technical training, specifically in newer drug regimens and management of adverse reactions.

All laboratory technicians had received training under NTEP, which included practical and skill-oriented training and training in NIKSHAY, and the training was reported as adequate. The ANMs and ASHAs, on the other hand, were trained in TB-related topics last during their induction sessions and since then are oriented on TB-related topics during half-day sessions held before ACF campaigns. ANMs receive orientation on the new guidelines in Thane during review meetings. These sessions focused on screening for TB, how to elicit a good sputum sample, and reporting mechanisms. NTEP staff members discuss implementation-related issues during review meetings, which were being held regularly across the sampled cities.

Focus groups with ASHAs and ANMs revealed gaps in technical knowledge and critical preventive messages. When asked what should one do if they do not have a mask or handkerchief to cover their mouth while coughing, ASHAs in most of the cities (exceptions include Ahmedabad and Surat) responded “cover it with your hand” instead of coughing into the elbow as the message. Similarly, when asked how one should dispose of the sputum, very few identified the need to cover sputum disposed outside the home with mud or soil. The ASHAs often misinterpreted the question of sputum disposal in the first instance as a question about eliciting sputum for testing. They promptly narrated the steps to be undertaken by the patient to provide a sputum sample. This is perhaps reflective of the content of training administered to these workers. ASHAs were not aware of the concept of drug-resistant or drug-sensitive TB. However, they were knowledgeable about pulmonary and extrapulmonary forms of TB. In their opinion, patients are given regimens of various durations. Still, the reason for the longer duration was not associated with drug-resistant TB. Very few ASHAs could list the side effects experienced by the patients, reflective of both the content of training and their limited interaction with the patients at the community level. ASHAs did not have clarity about the relationship between TB and HIV.

- **Cough etiquette.** Accredited social health activists demonstrate proper coughing etiquette after being taught (photo by Ranjani Gopinath).

Similarly, many ANMs could not identify coughing into the elbow as a means of preventing transmission, and were not clear about terminologies such as DRTB and drug-sensitive TB (DSTB), and could identify only a few side effects of anti-tubercular medicines. Table 7 summarizes the roles performed by each functionary.

Table 7: Roles Performed by the Urban Primary Health Care Functionaries

Functionary	Roles
Medical Officer	<ul style="list-style-type: none"> • Identify presumptive patients and refer to designated microscopic center staff for diagnosis • With support from Tuberculosis Unit staff, initiate treatment for drug sensitive patient • Refer diagnosed drug resistant patients (based on results of the cartridge-based nucleic acid amplification test) for pre-evaluation and initiation of treatment at the drug resistant tuberculosis facilities • Manage common side effects • Review Nikshay Poshan Yojana data for the facility with the designated microscopic center staff • Support field-level functionaries in retrieving patients lost to follow-up • Participate in ACF campaigns
Laboratory Technician	<ul style="list-style-type: none"> • Collect sputum sample • Prepare and test smears for acid fast bacilli • Implement standard operating procedures and biomedical waste management • Maintain laboratory registers and Nikshay Poshan Yojana laboratory parameters
Auxiliary Nurse Midwife	<ul style="list-style-type: none"> • Generate awareness among the UPHC population • Collect sputum sample from presumptive patients and facilitate referral to the UPHC • Support the TB health volunteers in confirming the patient's place of residence • Participate in ACF campaigns and supervise accredited social health activists • Counsel family members and patients • Refer patients with side effects to the UPHC • Inquire with private providers about patients on TB treatment, when collecting data for routine immunization and other notifiable diseases
Accredited Social Health Activist	<ul style="list-style-type: none"> • Generate awareness in the slum coverage area • Collect sputum sample from presumptive patients and facilitate referral to the UPHC • Support the TB health volunteers in confirming the patient's place of residence • Act as a treatment supporter • Counsel family members and patients • Participate in ACF campaigns • Refer patients with side effects to the UPHC

ACF = active case finding, UPHC = urban primary health center, TB = tuberculosis.

Source: Asian Development Bank.

Gaps and challenges in performing the roles. The Medical Officers rely on the TB Unit staff (the TB Health Volunteer and the Treatment Supervisor) for managing the patient once diagnosed and seem to play a limited role after that. Medical Officers participate in organizing ACF events, but they are not actively involved in identifying workplaces for introducing interventions or mapping migrants in the area, coordinating with private providers or the PPSA, organizing awareness campaigns, nor organizing in-depth counselling for patients and their families. They rely on the laboratory technician to manage drug inventory of the TB regimens. In predominantly migrant localities where the TB Unit functionaries, as well as the ANMs and ASHAs have expressed difficulty in retaining patients on treatment, Medical Officers had not reached out to communities or elected representatives with sensitization messages. This is reflective of the perceived clinical role of the Medical Officer and overall lack of convergent approach to health care delivery in urban areas. Medical Officers also report nonavailability of time to play a more significant role. A case study of a Medical Officer performing a comprehensive role is presented in Box 2.

Box 2: Case Study—Role of a Medical Officer in Implementing Tuberculosis Control Measures in Urban Areas

Dr. Harish Sanodariya is the Medical Officer of Bapunagar Urban Primary Health Center (UPHC), Ahmedabad. The UPHC covers a population of 89,000, half of whom are migrants. Trained in leadership courses, this full-time Medical Officer, a trainer himself, has mapped the dense migrant areas, organized awareness campaigns, involved the self-help groups of the National Urban Livelihood Mission for generating awareness, and linked patients to welfare schemes. He has mapped the private providers (four allopathic physicians and 10 homeopathic and Ayurvedic practitioners) and their notification practices (all four allopathic providers notify) in his area. He coordinates with the elected representatives (ward councilors and the local MLA). He ensures that urban health and nutrition days include health education sessions. He has empowered the MAS or *mahila arogya samiti* (women's health committee) (women's health committee) with three rounds of training that have resulted in tuberculosis (TB) referrals from the MAS. MAS groups are utilizing the grant amount to provide TB patients with protein-rich *chana* as nutritional support. He believes that while the ACF events are not yielding as many sputum positive cases, they are an exercise in generating awareness. The UPHC maintains a referral rate of 3% and above for suspected patients identified. Dr. Sanodariya exemplifies the expanded role that a Medical Officer can play in strengthening TB interventions.

Source: Asian Development Bank.

The roles of ASHAs and ANMs limited by patient community's reluctance to be supported by them. The ANMs and ASHAs predominantly perform reproductive child health roles and are brought into action as a TB provider mostly during the ACF events. The TB Unit teams identified ANMs and ASHAs as supportive functionaries in confirming the patient's address, following up a patient on treatment, and supporting retrieval of patients lost to follow-up. However, the ANMs and ASHAs reported challenges in performing a more supportive role. Since they are well recognized in the community, their visit to any household gives rise to discussion in the neighborhood. People would want to know about the reason for the visit, especially if the household does not have a child or a pregnant woman, such discussions lead to unnecessary suspicions. Patients thus prefer visits by the TB Health Volunteer or personal visits to the UPHC when under treatment. Alcoholism is one of the common causes of irregular medicine intake reported by health functionaries. ANMs and ASHAs find it uncomfortable and difficult to engage male patients who are alcoholics and rely on the TB Health Volunteers or the Medical Officer to ensure adherence among the patients.

Only a few ASHA workers are acting as treatment supporters, as most patients prefer to approach the UPHC for collecting medication. Not all ASHAs and ANMs were aware of all the patients in their area. The number of patients currently under treatment at the facility did not match with the number listed by these functionaries. Furthermore, they are not knowledgeable enough to provide answers to frequently asked questions by the patients. For example, patients want to know whether they need to take all the medicines in one go, or whether they should take them in the morning. On a positive note, ASHAs and ANMs in almost all cities were found to possess receptacles for collecting sputum and reported collecting them as well. However, they reported reluctance by presumptive patients to provide a sputum sample owing to the stigma attached to the disease. Also, the ACF events have created awareness among the communities about the purpose of the sputum sample. “*Hamen TB nahi hai, hum kafnahin denge*” (I don’t have TB; I will not provide a sputum sample), is the oft-heard refrain by the ANMs and ASHAs. The messages disseminated by the ASHAs and ANMs are focused on symptoms of TB, eating nutritious food, and refraining from spitting sputum everywhere. They generally miss out communicating about which protein-rich foods to eat, how to dispose of the sputum, and use of elbow method for coughing.

All laboratory technicians were performing adequate roles. However, some in UPHCs with larger slum coverage and with a higher incidence of TB reported being overworked with routine, antenatal, and acid fast bacillus smear.

Issues about contractual TB staff. The Laboratory Technicians, TB Health Volunteer, Senior Treatment Supervisor, Senior TB Laboratory Supervisor, and DRTB Supervisors are the contractual staff of the NTEP. They are paid meager salaries, have little to no promotional avenues, and are not covered by insurance. Despite this, their performance is exemplary. Patients knew their names and phone numbers, and they knew the names of their patients. The kinship was evident in each city. However, these functionaries who are exposed to TB (including DRTB) daily have not been provided with high-grade masks and are not eligible for sick leave. A case of a TB Health Volunteer suffering from a fracture and losing wages for 3 months was shared during interviews conducted with the NTEP staff members. It was also highlighted that the sanitary workers of the corporation are paid more than the LTs and receive medical and other benefits. These functionaries are also overworked as they support increasing numbers of patients in high-burden or migrant-dense pockets of the city. There is a need to reconcile population coverage of these functionaries and review their contracts for better employment conditions.

Improving management at the local level and feedback to stakeholders. While UPHC generates data on various aspects of the National TB Elimination Program (NTEP), the Medical Officer is not empowered to assess NTEP’s performance. For example, current trends and information on how his UPHC compares with other similar setups are not available. Seeing the big picture can help Medical Officers in addressing challenges and improving various components. Similar feedback on successes achieved and challenges confronted may be shared with all stakeholders (including projects such as JEET), and used in subsequent training courses.

While there is healthy coordination between UPHC and NTEP staff, greater supervision is needed to ensure quality services from the health functionaries and MAS. This supervision should provide not only relevant information but also on-site training in various aspects. Better equipped and knowledgeable ANMs, ASHAs, and MAS can bring about vast improvements because of their continuous presence and role in the communities.

Designated microscopic centers are working well. Continuous quality improvement shall facilitate the detection of more cases. There is, however, a need for a substantial number of reference laboratories, especially those that rapidly diagnose and detect resistance through nucleic acid testing (NAT).

B. Access and Utilization of Care

The study conducted 16 FGDs with 136 patients in the six sampled cities. The discussions focused on the patients' knowledge about their disease, their practices pertaining to the prevention of transmission, their experience with the care provided, and availability of community-level support.

1. Knowledge, Attitude, and Practices among Patients and Communities

Limited knowledge among patients. Very few patients in any of the cities were aware that TB is caused by bacteria transmitted through the air or upon exposure to infected sputum. The responses to what caused TB ranged from pollution, unhygienic environment, smoking, and poor nutrition. However, most patients were aware of the symptoms of TB and responded with “cough and fever for 2 weeks; weakness; loss of weight; and chest pain.” Only two patients (both college-going students in Surat and Mumbai) mentioned hemoptysis as one of the symptoms. Patients were aware of various sites of TB; most commonly cited include pulmonary and lymph node TB. A patient in Mumbai said “Except for nail and hair, TB can affect any part of the body.”

Awareness and practices on the transmission of the disease were explored to understand cough hygiene and sputum disposal. Patients were aware of the need to cover their mouth while coughing and using a mask. However, when questioned what they would do if they did not have a mask or cloth to cover their mouth, almost all reported using their hand instead of their elbow to cover their mouth. Most patients were aware and reported disposing sputum in the washroom or a receptacle filled with mud or phenyl. However, most did not know where to dispose of sputum while outside their home. Disposing sputum in a drain or covering the spit sputum with mud were responses given by only a handful of educated patients. Patients being medicated for the first time believed that TB could be cured as opposed to patients on retreatment regimens who were more skeptical. However, all patients reported that the way to cure TB is adhering to the regimen.

Most patients had not heard of the terms MDR, XDR, or drug-resistant TB, even when they were on a DR regimen. Instead, they identified the regimen in terms of the period of the complete treatment. Similarly, they understood the consequence of non-adherence to the treatment as prolongation of the treatment in the period. Most patients were familiar with HIV/AIDS; however, they were not aware of any relationship between the two diseases. Some however thought that if a person had one disease, they could also get the other, including if a person had TB, they could get infected by HIV. None of the patients had any understanding of co-morbidity with diabetes mellitus, except that they have to ingest additional medication for the latter.

2. Access to Care

The time gap between symptoms and initiating treatment. Patients in the FGD were asked to describe the journey from initiation of symptoms to starting the medication. Almost all patients spent at least a week before seeking care for their symptoms. Most sought care from a private provider proximate to their area of residence. Except for one focus group (a patient had a relative previously treated for TB at the same public facility), none of the patients approached a public facility for their initial symptoms. The pathway to accessing appropriate care is presented in Figure 21. The illustration depicts the time taken for the patient to be notified within the system as well. It takes between 30–45 days for the patient to be initiated on treatment from the day the symptoms appear. This pathway is applicable to patients of lower socioeconomic strata as patients with better means continue care with the private provider.

Private versus public sector utilization patterns. Patients delay seeking the care of a provider in the initial week as they buy over the counter (OTC) medication for cough and fever from the chemists. When the issue is not resolved, they approach a private provider. The most common reason for approaching private providers is proximity to residence. However, other reasons were also shared by patients for their preference for private providers. Most patients were not aware of the presence of the primary health facility. However, they were aware of the available tertiary public facility. Very few had previously sought care from the UPHCs for other illnesses. Along with long wait time and perceived negative provider behavior in the public facilities, patients felt that public facilities provide the same medication for different diseases—“*har marz ki ek dawa hai sarkari dawaikhane me*” (“Every illness has the same treatment in the government clinic”)³. In other words, patients felt that the appropriate medication was not available in the public facilities.

Patients reported having undergone x-ray chest, blood test, and sputum test for pulmonary symptoms; and ultrasound and fine-needle aspiration for lymph node enlargements in private providers. They reported receiving the option of being treated in the private or the public sector. They were informed about the availability of free medicines in public facilities. However, the patients feel that providers were not aware of the nearest DMC and were referred to a tertiary facility when patients opted to be treated in the public sector. There is yet another delay before the patients reach the tertiary sector. Here, they are diagnosed again and are initiated on treatment, before being referred to the closest facility. This pathway is shortened for presumptive patients identified during the ACF campaigns as they are diagnosed by the primary facility and initiated on treatment.

Limited information provided to the patients. Patients reported being counselled at the public facilities by the TB Health Volunteer or the TS. They recalled information sharing regarding the importance of adherence, eating nutritious home-made food rich in protein (“eat eggs”), avoiding spicy foods, and maintaining a hygienic environment. They were also aware of wearing a mask, covering the mouth while coughing, disposing sputum in a designated container or the bathroom, and reporting

³ Every illness has the same treatment in the government clinic.

any family member with symptoms. They also provided information on digital adherence mechanisms if the city was implementing one. None of the patients reported receiving any written information on TB or reported the use of communication materials during the counselling session. This was the case across all six cities. Furthermore, patients at the end of the FGDs asked several questions pertaining to dealing with the consumption of medicines, nutritional incentive payments, side effects, as well as the potential for transmission. While the research team ensured that all focus groups were provided with information, this throws light on the need for an information package that addresses frequently asked questions (FAQs) for the patients.

Stigma influences place of accessing medicines. Most patients prefer to receive their medicines at the facility level instead of seeking them from a depot holder at the community level. This preference stems from stigma associated with the disease. Women and men seem to face equal stigma; however, the stigma was attached more with patients of marriageable age. Stigma emanates from being excluded by the neighborhood and relatives from social events and interactions. Ahmedabad was the only city where patients were comfortable revealing their status to people other than close family members. According to a group in Behrampur area, Ahmedabad: “This is a disease like any other, if we take precautions, then where is the problem in socializing”. Patients further prefer to be supported by the TB Health Volunteer rather than the ANM or the ASHA. This is because the latter are familiar figures in the community and a visit by these workers starts an enquiry from neighbors about the nature of the disease. Patients did not report any problems with distances, loss of wages, or behavior of staff members at the UPHCs while seeking treatment. However, a few debilitated patients reported the loss of employment owing to their condition, but this has not influenced their treatment. UPHCs in Mumbai reported that some patients prefer to seek care from a facility closer to their workplace rather than their residence to avoid being identified as a patient. Interviews with private practitioners also revealed that patients from rural areas from abutting districts seek care with them—both because they prefer the provider, and because they can avoid stigma. None of the patients was aware of when a patient on medication becomes noninfective.

Challenges faced by patients with co-morbidities. Although nonreactive patients were not aware of their HIV status, people with diabetes mellitus reported being tested for blood sugar regularly and receiving medication from the facility. Very few patients with reactive HIV tests and on ART were encountered during the FGDs as most receive both medications from the ART center. The only challenge reported about a patient with co-morbidity was the number of medicines that the patient has to ingest.

Screening of family members being done. All patients reported having their family members screened for symptoms and children below 6 years of age being tested and provided prophylactic therapy as well.

Adherence to treatment and challenges. When asked if they ever get tired to ingesting medicines daily, patients were emphatic about the need for adherence: “If I want to be cured, I must ingest the medicines.” However, most faced challenges in ingesting the medication, especially in the intensive phase. The first challenge is the number of tablets the patient has to ingest. Some reported having been advised to phase the ingestion over a few hours in the morning. However, many patients from the FGD were keen to understand how to resolve this challenge. Most patients reported nausea, vomiting, indigestion, giddiness, joint pains, and weakness during the course of treatment. The side effects experienced and reported by patients on DR regimens included skin pigmentation, loss of hearing, loss of hair, and malaise. Most patients were not aware of the major adverse reactions unless they had experienced one, as they had not been counseled about these by the facility. Patients had instead been asked to report any physical symptoms to the Medical Officer at the facility. A few patients on retreatment regimens reported nonadherence owing to alcoholism. This challenge was emphasized more by the health care providers than the patients, perhaps because the system lost these patients to follow up.

Support to adherence. Patients in all four cities reported using the 99DOTs or the Medication Event Reminder Monitor mechanism of digital adherence. No reported challenges were using these systems. However, these systems were implemented on a pilot basis and are not ongoing in some of the cities now. The ULBs in Mumbai and Thane have raised funds under CSR to provide cereals and pulses or protein mix to the patients. The patients well appreciate this. Patients from other cities suggested that the public facilities should provide nutritional support, especially in the form of protein mix. Patients were aware that such products were available in the market, and some even had been using them but were unaffordable for many.

Patients reported relying on their family members, TB Health Volunteer, TS, and DRTB Supervisors for adherence support. While many patients reported being contacted by the ASHAs and ANMs, very few reported reaching out to these functionaries for any support. This is perhaps because of two reasons: first, the stigma associated with reaching out to these grassroots functionaries; second, the reduced level of knowledge of these functionaries to address challenges faced by the patients.

- **Nutritional supplement.** Nutritional support from Mumbai urban local body. (photo by Ranjani Gopinath).

Delayed financial support through direct bank transfers. Most patients in the four cities of Belagavi, Bengaluru, Mumbai, and Thane reported not receiving their financial incentives or not receiving them on time. According to the patients, their payments were pending for at least 3 months preceding the date of the FGDs. Most patients in Ahmedabad and Surat reported receiving incentives with only 1 month's worth of incentives due. This was further investigated following the completion of the discussions. Each patient ID was checked in NIKSHAY to understand the disbursement status. The system had rejected bank accounts of a few patients. (The rejected disbursements of patients with valid bank accounts owing to some system issues are discussed in the earlier section.) Patients recommended that the timely release of financial incentives would help them adopt a better nutritional diet in their economic situation.

Patients satisfied with the quality of services in UPHCs. Patients were highly satisfied by the care provided by the UPHCs and support provided by the functionaries. They did not experience any wait time and found the behavior of the staff courteous and supportive. Some reported receiving additional medicines when they had to travel or transfer out to their villages. In some cities like Mumbai, ULBs have memoranda of understanding (MOU) with a private entity for subsidized x-rays. In cities such as Thane, the ULB has installed x-ray machines in selected UPHCs. Patients appreciate the availability of such services. In other cities, patients had to visit the tertiary facility, which entailed long wait times, and rude behavior in some instances as well—a source of dissatisfaction. Patients in Mumbai, however, experienced stock-outs of kanamycin and had to make out-of-pocket expenditures during the stock-outs. The City TB Officer indicated that the stock-out was mainly due to delays in manufacturing by the pharmaceutical company. Overall, the patients reported satisfaction with the quality of medication, although prior to seeking care from the public facilities they held contrary views. They further said they would recommend any presumptive patient to the UPHC. They perceived that this facility dispenses high-quality medicines and that diagnostics are free.

C. Migrant Strategies and Service Delivery

The sampled cities are destination sites for migrant labor from not only within the state but also from across the country. While Mumbai and Thane witness in-migration from states such as Bihar, Madhya Pradesh, Uttar Pradesh, and from within the state, Ahmedabad and Surat receive migrants from Chhattisgarh, Madhya Pradesh, and Rajasthan. Bengaluru receives migrants from with Bihar, Odisha, Uttar Pradesh, as well as from within the state. Belagavi mostly receives seasonal migrants during sugarcane harvesting (mostly in periurban areas). However, owing to rapid development activities in recent years, it also has migrants in the construction sector.

We identified and met several migrants (organized and unorganized sectors) during this study. In Mumbai, the study team spoke to workers employed with the Mumbai Metro Rail Corporation and migrant tailors employed in the unorganized textile business. In Thane, the study team met with migrants being reached by an HIV/AIDS targeted intervention for single male migrants, and randomly identified a building construction site that employed migrant workers. In Ahmedabad, the study team visited a targeted interventions site of the HIV/AIDS program and another targeted intervention site for building construction workers. In Surat, the study team met migrant workers employed in two diamond cutting businesses. In Bengaluru, the study team met migrants employed in building construction and a targeted intervention for truckers situated at a pit stop. In Belagavi, migrants employed in road and building construction sites were met. In all, the study team conducted 12 FGDs with 105 migrants.

1. Delivery of Care

Comprehensive migrant strategies not available. All states, cities and UPHCs visited were reaching out to migrant population with TB interventions. This is mostly in the form of ACF camps organized at the migrant sites, and to some extent through HIV/AIDS targeted interventions. Some efforts have been initiated to coordinate with organizations that employ migrant workers to facilitate ACF among them. However, states sampled by the study are yet to develop and document a comprehensive strategy for not only identifying all migrants but also to address specific challenges faced to retain migrants under treatment.

Karnataka's strategy for reaching migrant population includes integrating TB services with the targeted interventions of HIV/AIDS; coordinating with the labor department to identify migrant workers and their geographies; working with labor-intensive industries that predominantly employ migrants; and identifying unorganized migrant workers at spots where they gather to be recruited for daily livelihood opportunities. The micro-plans developed for conducting ACF events identifies particular pockets with a vulnerable population and reach out to them with case finding services.

In Maharashtra, coordination with HIV targeted interventions is minimal although ACF micro-plans map and list vulnerable populations. Coordination with the labor department and labor-intensive industries is yet to be initiated. Gujarat leverages the HIV targeted interventions to reach migrant workers with TB messages, and also organizes ACF events. The state has also initiated coordination with industrial corporations to conduct ACF; however, it is yet to coordinate with the labor department to identify all migrant workers.

Available mechanisms for reaching migrants not leveraged in Mumbai. The Maharashtra State AIDS Control Society has signed an MOU with the Mumbai Metro Rail Corporation. As a part of this MOU, all workers recruited by the corporation undergo HIV testing during the pre-employment phase and receive information about the disease. The team visited one of the Mumbai Metro Rail Corporation sites and reviewed the TB facilities available to the workers. There are six such sites in Mumbai and recruits about 800 workers every month from states such as Assam, Bihar, Karnataka, Rajasthan,

Telangana, Uttar Pradesh, and West Bengal. The period of employment ranges from 4 months to 18 months, depending on the nature of work. The on-site occupational and safety health center caters to minor injuries. It refers to workers with major injuries to three partner corporate hospitals. The supervisor reported that a TB patient would not be recruited, and they had not come across any presumptive TB patients among the workers. A total of 17,320 workers had been screened for HIV in the past 2-1/2 years, of which nine were found reactive. While the clinic had displayed posters on HIV, it lacked any material about TB. The clinic supervisor was not aware of the closest UPHC nor have had any visit from the UPHC staff. They were aware of the nearby maternity center in Marol, whose malaria workers had visited them.

Coordination with targeted interventions weak in Mumbai. The Mumbai District AIDS Control Society implements several targeted interventions in the city. One of them is a single male migrant project managed by the SHADE NGO. Covering a population of 20,000 vulnerable male migrants from states such as Uttar Pradesh, Bihar, Chhattisgarh, West Bengal, rural Maharashtra, and Tamil Nadu employed in leather, garment, and *zari* making sectors, the project reaches workers with both HIV and TB interventions. Although TB is not a focus for the targeted interventions, the NGO conducts screening for TB, and presumptive patients are sent unaccompanied to the nearby health post. If a patient is HIV reactive, then an accompanied referral is made to the ART center. The NGO has a strong outreach into the community; however, they lack information, education, and communication (IEC) materials on TB. The TB Health Volunteer and the TS coordinate with the NGO staff; although an ACF event in December 2019 did cover their geography. The study visited the worksite of migrant tailors and found that although the ANM had marked her visit on the tenement's wall, she had not met the male workers, as they were not aware of the existence of the closest UPHC. Discussion with the Mumbai District AIDS Control Society revealed that migrant mapping had not been done since 2009. However, a validation of key population is ongoing. While convergence is occurring at the level of the facility, they identified a need for strengthened coordination at the city level to address co-morbidity challenges.

Targeted intervention NGOs in Thane focus on TB. The officer-in-charge for TB in the Thane Municipal Corporation is also responsible for the implementation of HIV/AIDS interventions. This has facilitated coordination with the NGOs implementing the targeted interventions. Of the 33 targeted interventions in the city, 12 focus on migrant population covering a population of 0.24 million. The district HIV officials have conducted sensitization training for ASHAs, ANMs, and the Staff Nurse to ensure TB-HIV coordination. Mapping of migrant workers by TMC was last done in 2014. However, the TMC is yet to coordinate with the labor department to map the migrants comprehensively. The team visited the targeted interventions site of NGO Bhanu Khan, which caters to migrant communities with people employed as construction workers, auto drivers, and vegetable vendors. Targeted intervention NGOs screen and refer presumptive patients to the closest facility. However, these referrals are not generally successful as the migrant workers are not able to access UPHCs during working hours. The NGOs had some posters on TB, but these were few and in Marathi (local language). The district HIV officials feel that there is a need to strengthen TB services for the high-risk group population.

Not all migrant sites are being covered in Thane. The study team approached a large construction project and met with the safety officer and migrant workers at the construction site. They had neither been covered by targeted interventions from an NGO, nor by the NTEP. The site employed nearly 800 workers who resided either on-site or in nearby tenements with facilities for minor injuries available on-site. The site had not been covered under the ACF event. Still, functionaries from the public facilities had approached these sites for a dengue survey.

Implementation of TB services for migrant workers in Bengaluru weak. The team visited two migrant sites, a building construction site (Concord construction site in Hassargatta) and a truckers' pit stop. The ACF event had not covered the following site, the targeted interventions NGOs lacked IEC materials, and the available material was in the local language. While the TB functionaries were

coordinating with the targeted interventions site, UPHC functionaries had not reached out. targeted interventions staff members had not initiated screening for TB as yet. The ACF micro-plans reviewed at the TB Unit level revealed that marginalized groups are being listed and covered. Workers at the site were not aware of the closest public facility.

Mapping not leveraged in Belagavi. Meeting with the labor department in Belagavi revealed that there are 81,000 construction workers registered in the entire district and 30,000 more registered under the Karnataka labor welfare board for organized sectors. Also, a board for the unorganized sector has been introduced since 2008. Workers are encouraged to register as this provides them opportunities to welfare inputs ranging from scholarships, maternity and medical benefits, and accidental death benefits. There are 600 citizen services centers in the district offering registration services. The department further organizes awareness camps to encourage registration. The unorganized workers' board focuses on workers such as *dhobhis*, street vendors, and daily wagers. It organizes the labor unions of these workers to provide welfare services. This was the first instance of the health department reaching out to the labor department and resulted in an invitation to a meeting with representatives of the Confederation of Indian Industries on labor welfare issues.

- **Targeted intervention.** Focus group discussion at a construction site in Belagavi during active case finding (photo by Ranjani Gopinath).

Belagavi coordinates targeted interventions, but implementation is limited. Two sites were visited in the city: a construction site covered by a targeted intervention NGO and another randomly selected construction site next to a tertiary public hospital. The first employed 180 workers from the state such as Jharkhand, Madhya Pradesh, and Chhattisgarh; the latter employed 260 workers predominantly from Andhra Pradesh. ACF had been conducted at the first site by the nearby facility, and the functionaries of the facility were aware of the site. However, the supervisor at the randomly selected site did not report ACF-like event or outreach by the public health facility. Neither site had any IEC materials or additional information about available services. Furthermore, the city does not have IEC materials in languages other than Kannada. Belagavi ACF micro-plans include workers employed in hotels and restaurants as most in the city are migrants but had not covered the hotel in which the study team was staying, identifying gaps in listing migrants as a part of the ACF micro-plans.

Strategy being articulated in Ahmedabad. The city has started identifying migrants under the micro-plans and has reached out to the Gujarat Industrial Development Corporation to coordinate ACF activities. According to the City TB Officer, the city has 7,000 industries and half a million migrant population. The city has not reached out to the labor department as yet. A meeting was conducted with the labor department to facilitate coordination. However, information on migrant workers was not readily available as the officer was new to the position.

- **Targeted intervention.** (Left) At a health camp run by a targeted intervention nongovernment organization; (right) a construction worker holding TB information materials (photo by Ranjani Gopinath).

Implementation ongoing and needs to be strengthened in Ahmedabad. Migrant workers were met at a textile industry and a construction site covered by a targeted intervention NGO. ACF had not been conducted at either site. However, the health camps conducted at the construction site by the targeted intervention NGO were screening for TB symptoms and providing each patient with Hindi IEC materials on TB. The targeted interventions NGO (Suloachana Memorial Health and Education Trust) reaches out to 60,000 migrant people employed as factory and construction workers. The NGO has developed a video for disseminating TB messages and invites the TB Health Volunteer to participate in their outreach.

Targeted intervention sites are not being covered by ACF events, as ACF in the city is yielding very few cases. The ACF micro-plans do not cover construction sites or hotels. The denim factory employs 550 workers, of which about 30% are out of state migrants. The workers are covered by the Employees' State Insurance and are referred to as ESI dispensary or partner private hospital when in need of health services. The closest UPHC is yet to reach out to this site, and there was no IEC materials available for workers at the site. A third site, an automated bakery (Super Bread) employing 50 workers, was also visited; however, the team was not allowed to meet the workers at the site. The bakery is covered by the same targeted intervention NGO and had a TB patient currently undergoing treatment working at the site. The bakery workers were covered under ESI and referred there during bouts of illness. They are also given health check-ups once in 6 months as they are food handlers. The Municipal Corporation further employs NGOs to generate health awareness among its vulnerable population, and these interventions cover TB messages as well.

Implementation ongoing and needs to be strengthened in Surat. There is no specific strategy for reaching out to migrants. They are covered under the ACF micro-plans. The targeted intervention NGOs in Surat also provide TB outreach and are working well in coordination with the TB functionaries. Two diamond polishing factories visited by the study team had been covered by ACF events; however, this did not have TB IEC materials available. The city has also not reached out to the labor department to better map the migrants in the city. However, according to the City TB Officer, 50% of Surat's population comprises migrants.

Data on the migrant status of the patient not being captured in NIKSHAY. As reported by NTEP staff members and program managers, this information is not carefully filled and hence not available. Besides, patients are reluctant to reveal their migrant status in fear that services may not be available. In the course of the treatment when the implementers realize the migrant status of the patient, the information is not updated in the system. Analysis of available data is provided in Table 8.

Table 8: Number of Migrants from among Those Notified in Six Cities, 2018 and 2019

City	2018		2019	
	Cases Notified	Patients Identified as Migrants	Cases Notified	Patients Identified as Migrants
Thane	4,124	0	4,539	0
Mumbai	34,678	87	33,819	79
Belagavi	428	95	321	78
B'lore Urban ^a	2,366	75	2,628	59
BBMP ^b	10,936	323	11,283	546
Ahmedabad	12,572	75	13,245	38
Surat	8,244	252	7,456	77

BBMP = Bruhat Bengaluru Mahanagara Palike.

^a B'lore Urban is Bengaluru Urban, the urban area outside the jurisdiction of the urban local body.

^b Bengaluru urban local body.

Source: Data on Nikshay Poshan Yojana submitted by cities.

2. Access and Utilization of Care

Awareness about TB and TB services low. Awareness about TB, its cause, modes of prevention and transmission, and available services were dismal among the migrants in the focus groups. Except for some workers engaged in the diamond polishing sites and some who had a patient as an acquaintance, none could even mention common symptoms of the disease. The workers at the construction site that was covered by the targeted intervention NGO in Surat also were generally unaware of the disease. This is perhaps because the health camps where workers are provided information materials are conducted every 3 months to screen for sexually transmitted infections, and the worker turnover is high at the site. The workers knew about HIV/AIDS but were not clear about the linkage between TB and HIV. None of the workers had ever suffered from TB, and very few knew of a patient with TB.

Access to NTEP services low. Workers migrate with the help of contractors based in their rural place of residence and then arrive at these destination sites. Construction workers especially migrated from one site to another across state lines and some had done this for nearly a decade. The status of their registration with labor welfare boards or health insurance coverage could not be discussed at some sites. This was due to the presence of their management staff members during the focus groups, which could not be prevented. However, workers reported approaching the health clinics at work sites for work-related injuries and seeking medicines from the local chemist for minor illnesses. For a moderate level of illness, they preferred the local private provider. They sought care from a tertiary public facility for major illnesses. The facilities are identified with the help of other workers on the site. While all migrants were aware of the local tertiary hospital, with the exception of that one site in Surat, none were aware of the closest UPHC. However, the group in Surat expressed a preference for using private care. The workers were aware of public health facilities in the originating rural areas but were not clear about the availability of the TB services at these facilities.

IV. DISCUSSION

A. Gaps in Control of Tuberculosis in Urban Areas

If India is to eliminate TB by 2025, it is important that transmission of infection is prevented; and that all patients are identified, treated, and treatment completed. There are gaps at each step of this process that are unique to the urban setting, which are presented here.

1. Preventing Transmission of Infection: Generating Awareness about Tuberculosis and Destigmatizing Tuberculosis

Knowledge is essential. Vulnerable populations are at a higher risk of contracting the disease and spreading it to the nearby community. This is primarily owing to their lifestyle and socioeconomic status. Furthermore, the level of knowledge and behavior of TB patients and the vulnerable population can affect their health-seeking behavior and, consequently, disease control at the community level. With newer techniques and strategies, the morbidity and mortality due to TB have declined considerably in the past decade. However, there is still a gap in accessing care by a vulnerable population, which results in cases being missed. Thus, it requires prompt attention from the public and private sectors as well as other partners.

Different studies in Indian communities show a considerable level of knowledge of TB symptoms among different population segments. A survey among slum dwellers in Chhattisgarh (Janmejaya 2017) found that a substantial proportion of respondents were aware of TB and its symptoms; however, they demonstrated relatively poor knowledge about the modes of TB transmission and its prevention. Ninety-five percent of the respondents knew that TB is an infection caused by germs, 82% knew that TB is transmissible, 63% were aware of different modes of TB transmission, 97% could tell about the symptoms of TB, and 76% of participants were aware of the curability of TB. In a West Bengal study conducted among general patients in a tertiary care hospital, while 62% could name at least one symptom of TB, the correct response to modes of TB transmission was elicited in only 31.5% of the respondents (Das et al. 2012). Among the slum dwellers of Surat city, 84% could name at least one symptom of TB, and 58% knew the modes of TB transmission (Mahida et al. 2014). Among pediatric caregivers in North Gujarat region, 62% could name at least one symptom of TB, and 68% (Jani, Bhambhani, and Thakor 2015) knew the modes of TB transmission.

It was observed in Chhattisgarh that 91% of the study participants were aware of one or other type of preventive measures for TB. However, this figure does not indicate complete knowledge regarding TB. Instead, they were only aware of one or other type of preventive measures. In Puducherry, 48.4% of slum dwellers reported that covering mouth with a handkerchief while coughing and sneezing can prevent the spread of TB (Chinnakali et al. 2013). Of the respondents, 75% said that TB could be prevented from spreading to other family members by some precaution, and 45% said that isolation of TB patients from other family members would prevent spread. Also, 51% were aware that using a handkerchief or a towel while coughing will prevent the transmission, and 18% were aware of chemoprophylaxis in children as a measure to avoid the spread of TB among children. When asked about their usual method of disposal of sputum, 43% of study subjects stated that they disposed of it in a dustbin or sewage. Regarding practices related to the prevention of the spread of TB, though 65% were aware of spread by coughing, 43% were disposing of their sputum in front of or at the back of the house. There exists a knowledge-practice gap, which should be focused on during health

education sessions. A similar study among the slum dwellers in Bengaluru city revealed that 40% of the participants were aware of the cough hygiene measures to prevent the spread of TB among family members (Suganthi et al. 2008).

This study similarly found that patients and communities had heard about the disease and were mostly aware of the symptoms. However, misconceptions about what causes TB were found. The responses to what causes TB ranged from pollution, unhygienic environment, smoking, and poor nutrition. Community members (MAS members) met by the study team displayed very little awareness about the prevention of transmission and available services. Patients and community members, while aware of covering their mouths while coughing, also reported using their hands to cover the mouth when a handkerchief was not available. Disposing sputum in a drain or covering the spit sputum with mud were responses given by only a handful of educated patients. This response was not forthcoming among community members. This is perhaps because the messages during ACF campaigns are geared toward case finding and do not focus on cough hygiene and safe sputum disposal, which are critical to preventing infection transmission. Most IEC materials reviewed by the study (posters and leaflets) focus on case finding (symptoms of TB) and do not address availability of free diagnostics, free treatment, financial support, or preventive measures. The TB Health Volunteer does patient and family counseling, but often does not use any interpersonal communication tools to conduct the counselling. No additional informative material is provided to the patient to ensure key messages discussed during the counseling session are not forgotten. Key messages on cough hygiene focus on what not to do, rather than what to do. Patients are advised about a nutritious diet; however, the recall of what constitutes a nutritious diet is very low among the patients.

In addition to a lack of active communication material, there are missed opportunities in reaching the population. There is poor engagement with community-based groups such as the MAS and the Self Help Groups. Modes of communication, such as social media are not being used and mid-media are being used in a limited manner. There is a need to build capacities of grass root level functionaries to deliver the messages effectively and appropriately.

Knowledge is not enough to remove stigma. Stigmatizing and discriminatory attitudes may discourage TB patients from actively seeking medical care, hide their disease status, and even discontinue treatment. It is expected that appropriate knowledge regarding TB should remove stigmatizing and discriminatory attitudes. A systematic review on stigma and tuberculosis concluded that cultural and economic variations related to gender, marriage, employment, play an essential role in stigmatization of TB patients (Chang and Cataldo 2014). A community-based survey of 30 districts (Sagili, Satyanarayana, and Chadha 2016) In India, surprisingly, found that stigmatizing and discriminating attitudes were independent of knowledge regarding TB. Three-fourths of respondents who knew that TB transmitted through the air when an infected person coughs or sneezes had stigmatizing attitudes. At the same time, three-fourths of respondents identifying that TB is curable had stigmatizing attitudes. A study conducted in Delhi (Dhingra and Khan 2010) observed that about 60% of TB patients hide their disease from other members of the community due to fear of stigmatization; this was more among middle- and upper-class people.

Stigma influences where care is accessed. This study found that stigma further impacts how and where care is accessed. Multiple reports of patients refusing sputum sample during ACFs further underline the stigma of the disease and the fear of the infection. Most patients prefer to receive their medicines at the facility level instead of seeking them from a depot holder at the community level. Patients further prefer to be supported by the TB Health Volunteer rather than the ANM or the

ASHA. ASHAs are familiar people in the community, and a visit by these workers starts an inquiry from neighbors about the nature of the disease. Interviews with private practitioners also revealed that patients from rural areas from abutting districts seek care with them—both because they prefer the provider, and they are able to avoid stigma. Stigma emanates from being excluded by the neighborhood and relatives from social events and interactions.

There is an urgent need to redesign the messages, thus addressing the fear of infection. The messages need to include (i) only a pulmonary patient can transmit the disease; (ii) transmission of infection can be prevented by maintaining appropriate cough hygiene and sputum disposal; and (iii) once on treatment, the patient becomes noninfective in a short period. The last message needs to be emphasized as this knowledge does not exist among the population.

Other considerations for prevention of airborne infections. As urban areas expand and modes of transportation such as local trains, metros, and air-conditioned buses become available across cities, the transmission of infection takes on a new dimension. The public health system will have to study the infection transmission within these crowded or closed vehicles and identify appropriate strategies.

It has been recognized that overcrowding in small enclosed spaces, inadequate ventilation, recirculation of contaminated air, increased duration of exposure, and susceptibility of exposed people increase the likelihood of airborne disease transmission. The public transport-built environments in countries with a high burden of TB, together with inadequate airborne disease control measures, may become hubs for the airborne spread of disease. The spread of TB is another example of airborne infection transmission. A study (Houk 1980) on TB spread in a naval ship concluded that infection transmission was due to rapidly and evenly dispersed infectious droplet nuclei throughout a closed environment with a recirculation ventilation system.

Regarding ground transport, a review by Mohr et al. (2012) reported 14 events of airborne infection transmission in public transport (commuter buses, school buses, train). Of these, 11 were of TB. Inadequate ventilation (windows and doors closed due to outside weather), ventilation systems (recirculation), and proximity to index cases (crowding) were found as environmental factors influencing the risk of airborne infection transmission on public ground transport.

Similarly, a systematic review on TB transmission on public transport (school buses, train, commuter van) has reported that contact investigations on these conveyances found a positive tuberculin skin test in 10%–78 % of the persons traveling with the index case (Edelson and Phypers 2011). They also highlighted that poor ventilation, closed ventilation systems, and proximity to index cases increases the risk of exposure to TB. Studies from countries with high TB incidence have shown that public transportation (often crowded and poorly ventilated) may play a critical role in the transmission and sustaining of TB infection (Horna-Campos et al. 2010; Andrews, Morrow, and Wood 2013).

A qualitative vulnerability profile of transport-built environments to airborne disease transmission is suggested in Figure 22 (Nasir et al. 2016).

Similarly, strengthening efforts of programs working on housing for the urban poor, along with exploring how ventilation could be made adequate in existing slum tenements, may also contribute to the prevention of infection transmission. Breaking the chain of infection transmission is critical to the success of any airborne infection control intervention (administrative, environmental or engineering, and personal protection) and knowledge and practices from health care-built environments to control airborne infection.

2. Accessing Care

Although early case detection, including ACF, is being carried out under NTEP, these are still reliant on passive case finding. Studies suggest that the diagnosis of TB is often delayed (Sreeramareddy et al. 2009). Some major reasons are repeated visits at the same health care level and nonspecific antibiotic therapies (Storla, Yimer, and Bjune 2008). Reasons for overall diagnostic delay have been attributed to both patients and the health system (Yimer, Bjune, and Alene 2005). There is evidence, albeit limited, where patients with TB symptoms often begin seeking advice in the informal private sector, such as chemists and unqualified practitioners, then seek care from qualified practitioners, eventually ending up in the public sector for free treatment (Kapoor et al. 2012; Mistry, N., S. Rangan, et al. 2016). Patients thus move from one provider to another before they are finally diagnosed and started on an antituberculosis treatment (Pantoja et al. 2009). A systematic review of Indian studies indicates a sizeable fraction of persons with pulmonary TB or presumed pulmonary TB first visit informal and private sector providers, particularly in urban areas. Also, multiple visits to health care providers appear to be an important risk factor for the total delay. The reported average patient delay ranged

from 6.0 to 267.7 days, but medians were at 19.4 and 18.4 days. Although there was a lot of variation, on average, 48% (median) of TB patients first visited the private or the informal sector. The median number of health care providers consulted before reaching a diagnosis was 2.7. The median patient delay, diagnostic delay, and treatment delay in urban areas were respectively 13.2, 31.0, and 46.0 days (Chandrashekar et al. 2014).

This study similarly found a delay of about 45 days (qualitative data) from the onset of symptoms to the patient being put on treatment. Patients delay seeking the care of a provider in the initial week as they buy over-the-counter medication for cough and fever from the chemists. If the issue is not resolved, they approach a private provider. Patients had visited at least two other providers before reaching the UPHC. Most patients were not aware of the presence of the primary health facility, although they were aware of the available tertiary public health care facility. Very few had previously sought care from the UPHCs for other illnesses. Owing to increased private sector engagement by the NTEP, private providers were referring poor patients to government facilities; however, they were doing so to the tertiary facilities. Patients' accounts reveal that the private providers were not aware of the nearest DMC and were referred to a tertiary facility when patients opted to be treated in the public sector. There is yet another delay before the patients reach the tertiary sector, where they are diagnosed again and are initiated on treatment, before being referred to the closest facility.

Analysis of UPHC data (note that all UPHCs under this study were DMCs) also reveals that half of the patients currently being treated were diagnosed at another facility. This highlights the need to ensure the utilization of services at the UPHC, although the need to generate awareness cannot be neglected. Since the inception of NUHM from 2014/2015 till 2018/2019, there has been a 66% increase in OPD Outpatient attendance (from 110 million in 2015 to 330 million in 2019). However, the outpatient load in UPHCs across the country is still low. Exposure visits of key community members to primary level facilities will provide an understanding of the kind of facilities available. The perception that the medicines and diagnostics may not be available can be removed. MAS can also contribute to popularizing the services of the facilities. This will also help decongest load on the tertiary level facilities, where the patient experiences longer opportunity costs.

3. Case Finding

Target versus achievement of case notification. Two pertinent issues emerge from this study. The first is the target setting, and the second is a strategy for active case finding. Each state, district, and the city is provided notification targets for the year. Discussions with senior official indicate that the target is based on past performance. A quick analysis reveals that the targets are either higher or lower than the average incidence in the country for the population covered by the city. There are two considerations here. One is the lack of knowledge of the burden of disease for the city (prevalence surveys are afoot though); and two, the fact that periurban and some rural patients may be accessing diagnostic and treatment facilities in the urban area. There is thus a need to revisit the methodology of setting these targets. The burden of TB analysis is much required if the performance of case finding and notification are to be accurately assessed.

The yield of active case finding. Analysis of ACF data shows a yield of 0.008% in Mumbai to 0.04% in Bengaluru Urban (patients diagnosed or population screened). This indicates that either the burden is decreasing or the most vulnerable are not being targeted. There is reported reluctance among the population in providing sputum samples during ACF owing to stigma. Furthermore, given that these events cover very few workplaces and are conducted during working hours, they may be missing presumptive cases among men, migrants, and working women. There is a need to map vulnerabilities effectively, include workplace interventions, as well as analyze the outcome of ACF events to understand the efficacy of the strategy better.

Increase in private sector performance. The 2018 and 2019 data reveal a substantial increase in private sector notifications owing to the PPSA strategy. While there is a need to strengthen the quality of services in private providers by ensuring adherence to treatment protocols; UDST; testing for co-morbidities; and advocacy, communication, and social mobilization, the continued support in the form of PPSA will be required to sustain participation.

4. Diagnosis and Management

What works. The program effectively adheres to protocols of diagnosis and treatment. The proportion of patients being offered UDST has increased from 2018 to 2019 in both sectors. UDST performance in public sector facilities increased, ranging from 17% (Surat) to 47% (Bengaluru Urban) between 2018 and 2019. Performance in private sector facilities increased, ranging from 88% (BBMP) to 218% (Surat) improvements between 2018 and 2019. Co-morbidities are being managed as per the guideline, and most TB patients are tested for HIV and diabetes mellitus.

Similarly, patients on ART are being screened for TB symptoms and put on treatment. HIV status is known for nearly 90% of the patients in the public sector notifications (2019 data). Cities have improved in this indicator as compared to 2018. Private practitioners report that they do not want to burden their patients with additional tests. The status has improved since the advocacy from the PPSA entities to improve access to HIV testing for patients being treated in private providers. In the public sector facilities, more than 90% of the patients notified in 2019 were screened for diabetes mellitus, and their status was known. These indicators improved in private providers substantially in 2019, with more than two-thirds of the patients being screened for diabetes mellitus.

What does not work as well. Areas requiring further strengthening are ensuring prophylactic treatment for patients on ART, children below 6 years of age, and contact screening. Also, adequacy of radiographic and CBNAAT facilities should be mapped and juxtaposed against the need for UDST and growing burden in the urban areas to ensure diagnostic delays do not occur. The analysis in six cities indicates that currently, the CBNAAT facilities may not be adequate in cities of Bengaluru and Ahmedabad. Furthermore, advocacy, communication, and social mobilization comprise the weakest link in the management of patients and needs to be addressed, as discussed in earlier sections. Frequently asked questions by the patients need to be collated, and answers made readily available to each patient.

Cities in 2019 screened two-thirds to 92% of the contacts of TB patients for TB, demonstrating improvements from the previous year. About three-quarters of children under the age of 6 were put on prophylactic therapy in the six cities except Bengaluru urban. Isoniazid Preventive Therapy (IPT) is being offered to about half of the people living with HIV. Challenges include the availability of drugs (Belagavi) and reported side effects among patients on ART.

Management of DRTB. The evidence regarding drug resistance in India during the last 4 decades is localized, inaccurate, or incomplete. As a result, India is witnessing two ends of the spectrum in addressing recently announced totally drug-resistant TB (Udwadia et al. 2012). According to the “Stop TB Strategy”, the new six-point strategy was introduced to address the challenges of TB–HIV and MDR TB (WHO 2010).

This study found that diagnosis and treatment protocols are being followed for all patients in all six cities. Sputum samples are tested, x-rays administered, and CBNAAT tests done as per the guidelines. However, there are gaps in actual implementation of these protocols owing to patient factors. Due to a load of cases in Mumbai, it takes 3–5 days to receive CBNAAT results. In cities such as Mumbai and Ahmedabad, the notifications are higher than the capacity of the CBNAAT machines to test samples,

if UDST were to be achieved. Partnerships have been forged with private diagnostic laboratories to offer free x-ray to patients as well as pre-evaluation tests for DRTB patients. While patients did not express any difficulties in accessing these centers, nonavailability of these tests under one roof potentially can lead to challenges for patient adherence and time delays as well.

The proportion of patients being offered UDST has increased from 2018 to 2019 in both sectors. UDST performance in public sector facilities increased, ranging from 17% (Surat) to 47% (Bengaluru Urban) between 2018 and 2019. Performance in private sector facilities increased, ranging from 88% (BBMP) to 218% (Surat) between 2018 and 2019. While UDST is still low with private providers in cities such as Ahmedabad, Bengaluru, and Surat, about three-quarters of the patients are being offered CBNAAT testing services.

Except for Thane, the cities had started more than 85% of the diagnosed patients on MDR regimens. Cities such as Mumbai that have a high burden of DRTB cases have forged a partnership with the Tata Institute of Social Sciences to provide 50 DRTB counsellors. Loss to pretreatment follow-up among these patients is between 4%–8% and is a significant challenge. Adverse drug reactions result in interruption of regimen for 1–2 months. As the burden of MDR TB increases, additional support will be required by cities as identified by Belagavi.

Improvements in overall TB management will subsequently prevent all forms of TB resistance. Very simple measures such as personal protection for health staff and structural improvements to the hospitals can be undertaken. These measures are not only feasible but also are also low-tech solutions (such as air extractors) in Indian settings (Escombe et al. 2007). Treating MDR TB requires hospitalization of patients. Instead of overloading tertiary hospitals, integration of treating resistant forms of TB should be done at the primary care level by improving the capacity of and provision of training to field level staff to manage MDR TB (Sans Frontières Médecins 2007). A national prevalence study is underway in India. This will screen 500,000 people in 625 districts across the country. The first National Anti-Tuberculosis Drug Resistance Survey (NDRS) from India was released on the occasion of World TB Day in 2018. The survey found that MDR TB is 6.19% (confidence interval 5.54%–6.90%) among all TB patients with 2.84% (confidence interval 2.27%–3.50%) among new and 11.60% (confidence interval 10.21%–13.15%) among previously treated TB patients. Finally, the public health community needs to engage in developing India-specific strategies of controlling the current burden and preventing further epidemics of drug resistance in different forms (Babu and Laxminarayan 2012).

Financial incentives. Attention is also required to ensure the financial incentives provided to the patients for their nutritional needs to reach them on time. Almost all cities performed poorly on this indicator, with only 10% (Thane) to 60% (Ahmedabad) of the payable amount paid in 2018, and 9% (Thane) to 83% (Surat) in 2019. The purpose of the financial incentive is to ensure poor patients can spend over their nutritional needs. This cannot be fulfilled if the amounts are delayed and provided after the completion of the intensive phase. The barriers to ensuring timely disbursement of payments are validating bank accounts and NIKSHAY system-related delays in payments. Cities such as Ahmedabad have resorted to making payments externally (outside the NIKSHAY systemic payments) to overcome the delays. This issue is also faced by public health facilities when it comes to disbursing maternity benefits (*Janani Suraksha Yojana*). In cities facing these challenges, limited attempts have been made to organize the opening of zero balance accounts for patients under the Prime Minister's *Jan Dhan Yojana*. NUHM has to coordinate in a structured manner with the PM *Jan Dhan Yojana* to ensure beneficiaries of the health system are connected to zero balance accounts.

Alcoholism. Alcoholism was reported as one of the common barriers to nonadherence. Patients on DRTB regimens also face challenges in adhering to medication owing to the side effects of the medicines. There are no interventions designed to deal with alcoholism at the primary level of care. Most cities in India do not have adequate rehabilitation facilities either. There is a need to address this as a public health issue,

rather than just a TB-related issue. Policymakers may consider funding the position of Counselor, Social Worker, and Mental Health Professional at the UPHC level as envisaged under the NUHM framework to be a first step in addressing this issue. Also, empowering community-level structures such as the MAS and self-help groups can bring about community-level accountability to adherence among alcoholics. Adherence among migrants is discussed in the next section.

Diagnosis and management in private providers. Over half of the estimated 4.6 million annual TB infections in India are treated by a scattered range of private providers. Over 80% of people with TB first attend private providers, yet substantial diagnostic delays occur, and diagnosis and treatment are of variable quality (Satyanarayana et al. 2011). This, combined with the absence of drug quality controls, leads to drug resistance. Studies conducted since the 1990s have documented the extent to which TB is diagnosed and treated in private providers, as well as the prevalence of largely inappropriate diagnostic and treatment practices (Sachdeva, K. S., A. Kumar et al. 2012; Uplekar and Shepard 1991). Patients from low-income households lose several months of their income in the process of paying for inappropriate diagnostics and treatments before starting approved therapy (Pantoja et al. 2009). As a result, there are delays in diagnosis, out-of-pocket expenditure, and irrational or unsupported treatment. Patients treated by private providers are uncommonly notified to the NTEP, despite existing government orders to that effect. Public health services such as surveillance, adherence monitoring, contact investigation, and outcome recording rarely reach privately treated TB patients. Thus, diagnosis and treatment of TB in private providers is both a problem and an opportunity.

A study conducted in 2010 (Sachdeva, K. S., S. Satyanarayana et al. 2010) of retreatment cases found that nearly half of the cases registered with the NTEP were most recently treated outside the NTEP setting (private sector). A higher proportion of patients registered as treatment after being lost to follow up (64%), and “retreatment others” (59%) were likely to be treated outside NTEP, when compared to the proportion among “relapse” (22%) or “failure” (6%). A qualitative study (Miller et al. 2012) of TB patients being managed in private providers found that doctors did not routinely refer patients with TB to government HIV testing facilities as per national policy guidance. If deemed appropriate, then testing was conducted privately. Testing was more common when a facility guideline mandated testing or a public-private initiative for TB management was in place. Doctors explained that they used their “expertise” and “judgment” to decide whether a patient is at risk. Despite this context, there were some factors found to support doctor initiation of HIV testing. These primarily were associated with other facility features, such as whether it was supported by a PPM program; if it had a trained, on-site counsellor; or if there was a hospital guideline mandating HIV testing for patients with TB.

In the last few years with the policy focus on engaging private sector participation, there have been significant improvements in the indicators from private providers. The Joint Effort for Elimination of TB (JEET) was launched in June 2018, under which the World Health Partners is working in seven cities: one, in partnership with Clinton Health Access Initiative (Ahmedabad and Surat in Gujarat and Darbhanga in Bihar); and another in partnership with the Foundation for Innovative Diagnostics (Ludhiana and Jalandhar in Punjab, and Kolkata and Howrah in West Bengal). JEET aims to ensure optimum standards of diagnosis and treatment as per the Standards for TB Care in India guidelines for patients initiating care in private providers. The project provides treatment-adherence support measures and facilitates extension of NTEP incentives to private sector patients.

These projects network doctors, laboratories, pharmacies, and informal providers into a cohesive system with a strong electronic backbone connecting them to enable better coordination of activities. The clients receive tests and medicines free. In order to seamlessly transition the project to the public sector and sustain it in the long-term, World Health Partners has providing government-procured supplies at private pharmacies that are to be provided free to the patients. Efforts are currently underway to also transition payment of various incentives to the government. Since its inception in April 2019, the model has produced 77,669 notifications.

The Tuberculosis Health Action Learning Initiative (THALI) funded by the USAID (2016–2020) works with the NTEP, municipal governments, and private providers to improve TB control across three classifications of cities, grouped based on population. John Snow Inc. is supporting THALI in Kolkata and adjoining districts to catalyze a dynamic process of identifying, developing, testing, and scaling up successful innovative solutions to strengthen urban TB control, especially among urban slum dwellers, with a focus on women and girls. Key elements of THALI include

- (i) identifying and accelerating scale-up of innovative approaches to improve the quality of private sector diagnosis, referral, and treatment of TB, through adherence to the recently released “Standards for TB Care in India”;
- (ii) strengthening the utilization of TB resources of the respective municipalities
- (iii) testing of technological innovations; and
- (iv) improving data for evidence-based decision making.

Similarly, the Karnataka Health Promotion Trust and TB Alert India implement THALI in cities of Andhra Pradesh, Karnataka, and Telangana, and works with communities and the health system to increase notification and ensure adherence to treatment. The interventions include campaigns for ACF and patient support groups, among others.

The private provider interface agency model was launched in 2014 and first mapped out 15 high-burden TB wards across Mumbai. The model was implemented by NTEP, WHO, and PATH. By 2011, health officials in Mumbai recognized that the spread of TB, including drug-resistant forms, had become a crisis. The Municipal Corporation of Greater Mumbai—in partnership with the Central Tuberculosis Division, the World Health Organization, and the Bill & Melinda Gates Foundation—subsequently formed the Mumbai Mission for TB Control (MMTBC). Since Mumbai reported the first 12 cases of totally drug-resistant TB in January 2012, health officials have made major efforts to reach out to informal, traditional practitioners who are often the first point of contact for people who may have TB. The MMTBC has been operational since August 2014 and has helped ensure local access to TB diagnostic and treatment services. The private provider interface agency model operates as part of the MMTBC. It is an innovative mechanism to network private-sector providers to enhance timely TB diagnosis and treatment. The idea to engage private providers to improve services was advanced by the Central Tuberculosis Division in its National Strategic Plan, 2012–2017.

However, challenges remain in improving the quality of TB care being provided in private providers. This study found that while the patient provider support agencies are ensuring that UDST, HIV, and diabetes mellitus screening, as well as patient follow-up are done, they have little control over what is prescribed, and if a patient does not want the contacts to be screened. Besides, counseling of patients and family members in infection prevention depends on the practitioner’s willingness to spend time with the patient. The private practitioners met by this study team did not have any communication material that could be shared with the patients, limiting the transaction of knowledge to the patient. Furthermore, clinics and hospitals did not display any communication material on their premises. Although PPSAs are providing technical updates to the practitioners, prescribing practices will have to be studied further, especially among the providers being supported by patient provider support agencies. Private providers expressed unwillingness to burden patients with the cost of screening for HIV. Linkages to free HIV testing have helped overcome this hesitation. Outcome reporting is improving owing to support from the PPSA functionaries.

Human resources for TB control. Almost all human resources staff recruited under NUHM are on a contractual basis. This obviates stability in their professional environment, which hampers their performance and outputs. Some of the staff members are on contract for the past several years (up to 14 years in some cases). This human resource has also been denied perks, which are usually enjoyed by their regular counterparts. These include medical care benefits and risk allowance to handle TB

continuously and DRTB patients. There are significant discrepancies between carrying home salary and perks between ULB (e.g., BBMP) and NUHM staff. This breeds frustration, which reflects in their performance. There is an urgent need to put in place a policy that enables human resources to give their best to the NTEP and make them satisfied members of the national team working toward achieving the target of elimination of TB. The National Strategic Plan, 2017–2025 articulates the need to provide improved employment benefits to NTEP’s contractual staff members, which includes health insurance. This process needs to be expedited to ensure commitment and the functionalities in the light of the increasing case load in urban areas.

Capacity building, especially of UPHC functionaries as well as the MAS needs to be strengthened. This will facilitate their strengthened participation. The younger Medical Officers lacked a thorough understanding of the new guidelines and adverse reactions experienced by the patients on drug-resistant regimens. Their familiarity with the NIKSHAY platform was also weak. The training of ANMs and ASHAs focuses on screening for TB, how to elicit a good sputum sample, and reporting mechanisms. These functionaries who are mostly employed for preventive actions at the community level need to be taught about critical preventive messages, especially those on cough hygiene and sputum disposal. Very few ASHAs could list the side effects experienced by the patients, reflective of both the content of training and their limited interaction with the patients at the community level. ASHAs did not have clarity about the relationship between TB and HIV. Similarly, many ANMs were not clear about terminologies such as DRTB and DSTB and could identify only a few side effects of antitubercular medicines. Strengthening their capacities in identifying and advising patients about how to deal with side effects could support adherence at the community level.

B. Participation of National Urban Health Mission and Urban Local Bodies in the Delivery of Urban Tuberculosis Control Interventions

Vertical health programs are mandated to be integrated under NUHM. In the urban context and under the NUHM, concerted effort is being made that this integration occurs at the UPHC level by creating strong linkages between the UPHC and programs such as NTEP, National AIDS Control Program, and National Vector Borne Disease Control Program. While the reproductive child health, malaria, immunization, and noncommunicable diseases are well integrated at the UPHC level in cities where the ULBs lead NUHM, challenges remain in ensuring strong linkages to the NTEP and National AIDS Control Program. Also, the convergence of interventions that improve social determinants of health is not comprehensive.

1. Role of National Urban Health Mission in Ensuring Effective Delivery of Tuberculosis Control Services

India is not capturing all presumptive cases of TB such that they can undergo diagnosis and treatment if found to be positive. When a presumptive patient is encountered either in the community by the ASHA, ANM, or Medical Officer in the UPHC, he or she is referred to the UPHC coverage area. This is the first level where a patient may be lost to follow-up; therefore, preventing this is one of the key roles of the UPHC. If the patient reaches the DMC and is diagnosed with TB but fails to collect the test results, the patient is traced by the TB Supervisor. An effective coordination between the ASHA, ANM, and TB Supervisor can help this process. Once the patient initiates TB treatment, the UPHC, as well as the ASHA, can act as the treatment supporter. Patients on long-term treatment need further support in adhering to the treatment, and this may be challenged by the migration of the patient within the city or to another geographical area.

To keep track of the TB patients across the country, the Government of India has introduced an information technology (IT) system called NIKSHAY. The innovative IT application of NIKSHAY makes it possible for the grassroots-level health care providers to track every TB patient. The most significant feature of NIKSHAY is that it promotes use of IT at the TB Unit level. More than 350,000 TB patients have been registered since its launch in June 2012. Such a TB patient database is being used at the district, state, and national levels for monitoring purposes. Whenever a new patient is registered on NIKSHAY, an SMS is sent to the patient with registration ID and details of the DOTS Operator along with an advisory note to take the regular medicine. Daily short messaging service or text messages are sent to all monitoring authorities in the Central TB Division, to state TB Officers, and to district TB officers, giving the number of patients, DMC, and peripheral health institution registered.

The Health Management Information System of NUHM currently captures one element of TB, which is the number of patients on DOTS. However, owing to the revisions required in the master facility, utilizing this data to comment on the performance of UPHCs and DH in supporting TB patients can lead to misinterpretation. An analysis of the NIKSHAY data for urban areas will help better understand the role being currently played by the NUHM facilities and study the barriers to performance, which can help develop responsive strategies for effectively integrating TB within the services of the UPHC or health and wellness centers.

NTEP and NUHM have collaborated to develop strategies to address urban TB. The NUHM NTEP Framework for integration identifies the following strategic interventions:

- (i) Incorporating UPHCs and CHCs as Peripheral Health Institutes under the NTEP, which would enable identification, sputum microscopy, referral, treatment, support to treatment, and monitoring through NIKSHAY by NUHM facilities.
- (ii) Radiography, CBNAAT, and pretreatment evaluation at urban secondary and tertiary level facilities.
- (iii) Strengthened program management by the establishment of city TB centers.
- (iv) Collaborative outreach activities and support to public–private partnerships.

The participation of NUHM in TB control activities currently does not reach the envisioned potential. Identified gaps are presented in Table 9 below.

Table 9: Role of National Urban Health Mission in Tuberculosis Control in Urban Areas

Potential Roles	Actual Performed Roles
Active Case Finding	
Generate awareness among the urban population about TB and its symptoms	ASHAs and ANMs are generating awareness about TB symptoms during ACF events. This is not done during other months of the year unless they meet with a presumptive patient.
Report patients identified in the CBAC forms for further diagnosis	CBAC forms are not being analyzed; however, any patient encountered is asked to provide a sputum sample
Leverage MAS to address stigma and care-seeking behaviors	Very few MAS are trained to address TB; awareness among MAS about TB is dismal
Partner with NGOs to build capacities of MAS and ASHAs in TB control at the community level	Except in Ahmedabad where partnership for IEC has been forged, this has not been explored by NUHM
Organize screening events through outreach campaigns	ACF events are NTEP-led, although NUHM staff participate; presumptive patients encountered during outreach camps are referred for diagnosis; however, no special outreach camps for TB is being organized for TB

continued on next page.

Table 9 *continued*

Potential Roles	Actual Performed Roles
Identify workplaces in the coverage area to initiate TB control services	NUHM is not involved in mapping workplaces, although vulnerable communities with pockets of migrants are identified for ACF
Detect and Diagnose	
Establish DMCs in UPHCs	Almost all UPHCs have been designated as DMC
Ensure radiography and CBNAAT services at secondary facilities	<p>These are planned as a part of the NTEP Program Implementation Plan submitted under the NUHM budget; NUHM is not a part of the planning process and merely submits the proposal</p> <p>Although radiography is available at the secondary centers in some cities, CBNAAT facilities are yet to be established</p>
Participate in city TB program management units	All UPHCs are involved in reviewing the TB program with the TB units and also at the city level
Treat and Support	
Ensure drug availability, follow-up, support for side effects, timeliness of DBTs, support adherence, and linking of patients to welfare schemes	<p>The NTEP leads drug management, and the Medical Officer coordinates activities with the TB health volunteers and the senior treatment supervisors. Follow-up of the patients is mostly done by the TB health volunteers.</p> <p>The ASHAs and ANMs play a limited role in supporting the patient. The Medical Officer manages minor side effects; however, the patient is referred to the tertiary center or the Drug Resistant tuberculosis center for adverse drug reactions as it entails changes in medication.</p> <p>Additional training of Medical Officers can ensure that most of the side effects of drugs are managed at the decentralized level. Timeliness of the Direct Bank Transfer is system-related and cannot be achieved at the UPHC level. However the Medical Officer can ensure that the patients whose bank accounts are not accepted by the NIKSHAY system are supported to open zero-balance accounts under the Prime Minister's Jan Dhan Yojana. This has not been explored by the UPHCs as yet.</p> <p>The TB health volunteers mostly support adherence to treatment. Although ASHAs and ANMs report helping the patients, there is a high reluctance among patients to be assisted by this group owing to stigma.</p> <p>UPHCs were not linking patients to welfare schemes.</p>
Ensure specific focus on patients at risk of loss to follow-up	Medical Officers counsel alcoholic and migrant patients when the TB health volunteer is not able to convince the patient. ASHAs, MAS, and ANMs play a limited role in supporting such patients.
Connect migrating patients to specific facilities in destination sites	The TB health volunteer plays this role
Prevent	
List, screen and treat contacts of patients for latent TB	The TB health volunteer represents this role
Deploy measures to prevent airborne infections at the facility	Facility assessments are ongoing, and NUHM should plan to budget for the renovations recommended. Currently, these actions have not been initiated.
Generate awareness about cough etiquette and sputum disposal	ASHAs and ANMs focus on generating awareness about symptoms of TB. Generating awareness on cough etiquette and sputum disposal is critical as a means of preventing infection transmission. There is a need to redesign the messages to ensure positive behavior. There is a need to develop interactive and pictorial IEC material as well, which include social media messages.

continued on next page.

Table 9 *continued*

Potential Roles	Actual Performed Roles
Generate awareness about nutritional support	Medical Officers, ASHAs, and ANMs focus on generating awareness about the importance of a nutritious diet; however, the messages are nonspecific. There is a need to redesign the messages to ensure positive behavior. There is a need to develop interactive and pictorial IEC material as well, which include social media messages.
Private Sector Engagement	
List private providers in a slum area and engage them in TB control activities	ANMs are listing the private providers in the area and report that they share information about available TB services. However, the lack of awareness among most patients about the existence of the UPHC means either these private providers do not cater to presumptive TB patients or are not referring patients to the UPHC because of competing interests.
Support treatment adherence among patients being treated by private providers and ensure NIKSHAY entry of treatment outcomes	The UPHC plays no role in supporting patients in the private sector. The TB health volunteer or the patient provider support agency leads this.

ACF = active case finding; ANM = auxiliary nurse midwife; ASHA = accredited social health activist; BBMP = Bruhat Bengaluru Mahanagara Palike; CBAC = community-based assessment checklist; DMC = designated microscopic center; IEC = information, education, and communication; MAS = *mahila arogya samiti* (women's health committee); MDR TB = multidrug-resistant TB; NGO = nongovernment organization; NTEP = National TB Elimination Program; NUHM = National Urban Health Mission; TB = tuberculosis; UPHC = urban primary health center.

Source: Asian Development Bank.

In conclusion, NUHM coordinates with the NTEP program, and with the establishment of the DMC at the level of the UPHC, coordination has improved. There is a scope for strengthening TB control activities, especially in the areas of generating awareness and demand, prevention, and addressing the social determinants of the patients.

2. Role of Urban Local Bodies

Control of tuberculosis by urban local bodies. In September 2015, the 193 Member States of the United Nations adopted 17 new social, economic, and environmental goals, the UN Sustainable Development Goals (SDGs), to be reached by 2030. The target of ending the TB epidemic by 2030 is embraced by the overall goal of health (SDG 3). SDG 11, which aims to make cities inclusive, safe, resilient, and sustainable, with targets to improve air quality and provide safe housing, will support TB control measures. Aligning actions for the SDGs for health and cities, including a focus on moving toward universal health coverage, provides an opportunity to ensure that TB control benefits from an approach that puts factors linked to physiology, health systems, and environment together in a comprehensive, unified view of risk.

In recent years, municipal authorities have actively joined, and often led, global development efforts on climate change, food policy and public health, including TB. The Zero TB Cities Project, formed in 2014, partners with municipalities and local governments to support communities move to “zero deaths” and help reverse the overall TB epidemic. It is based on the expectation that local authorities will be more responsive to their populations than central governments (Das and Horton 2015). With strong leadership, greater autonomy, adequate resources, and proximity to the people they serve, the populations of cities and their leaders have the potential to catalyze the end of TB.

Envisaged role in India. The NUHM framework envisages that the ULB will implement NUHM in the seven megacities, namely Ahmedabad Bengaluru, Chennai, Delhi, Hyderabad, Kolkata, and Mumbai. For the remaining cities, the health department would be the primary implementation agency for NUHM. However, for cities or towns where capacity exists with the ULBs, the states have the flexibility to hand over the management of the NUHM to ULBs.

The 74th Constitutional Amendment Act (74 CAA) enacted in 1993 was a critical piece of legislation meant to herald a fundamental shift in the philosophy of governance in India, by articulating a vision of decentralized power and responsibility through the provision of constitutional status for urban local governments. The Model Municipal Law circulated by the Ministry of Urban Development provides guidance to states towards implementation of the provisions under the 74th CAA. The Model Municipal Law classifies municipal functions into three categories, and under the category of additional functions, curative care is identified as well. There has been an expansion of roles being performed by the municipal health teams under NUHM. The municipal health teams in some cities are participating in carrying out health assessments, developing city health plans, supporting the identification of infrastructure for health facilities as well as monitoring the implementation of NTEP. However, this varies from city to city and varies based on inherent capacities.

Beyond health delivery: the ULB's role. Achievement of urban health is a function of socioenvironmental determinants of health. A thorough understanding of how the urban environment shapes the health of populations requires consideration of different features of the urban environment. The study of the social determinants (Marmot 2005) of health is embedded in the recognition that the solutions to poor health, material deprivation, lack of access to health care, clean water, sanitation, and the like are not simply alleviated with the provision of resources or technical assistance. Urban health is a result of several social determinants (Figure 23). Rather, it is the understanding

Figure 23: Social Determinants of Tuberculosis

BCG = Bacillus Calmette–Guérin, MDR-TB = multidrug-resistant TB.

Source: Hargreaves, J. R. et al. 2011. The Social Determinants of Tuberculosis: From Evidence to Action. *American Journal of Public Health*. 101 (4). Pages 654–62. doi: 10.2105/AJPH.2010.199505.

that when available, access to resources and technical assistance is often socially determined (Kim et al. 2000). The determinants include unemployment, unsafe workplaces, living conditions, and lack of access to health systems.⁴ Social determinants of health also include social factors such as place of residence, race and ethnicity, gender, and socioeconomic status (World Health Organization 2006). Consequently, it is essential to understand the roles of various urban stakeholders.

Advantage of ULB-led NUHM model. Some social determinants of health are currently addressed better under ULB-led NUHM models. The innate strength observed in cities where the ULB leads NTEP implementation is the ability to effectively address social determinants such as water and sanitation as well as vector control, as these functions lie under the same organization. The ULBs administer programs such as National Urban Livelihood Mission and Housing for Poor at the decentralized level. Also, the ULBs manage welfare measures from their social welfare departments. The convergence of interventions that improve social determinants of health is, however, not comprehensive. The advantage is yet to result in the leveraging of public development programs for improving the health of the urban poor. For example, self-help groups available under the National Urban Livelihood Mission have not been leveraged to reach communities with TB messages. These groups are federated at “area,” ward, and city level. They have received skill-based training under NTEP and can prove to be capable community-level partners.

Mechanisms in urban local bodies for tuberculosis control. Mumbai, Thane, Ahmedabad, and Surat ULBs are leading the implementation of the NUHM. Thus, they also implement TB interventions. Each ULB has an officer-in-charge of TB who coordinates with the NUHM nodal officer and the HIV nodal officer. In addition to administering NTEP, cities have identified specific local needs and introduced innovations. The private provider interface agency model deployed by the Mumbai ULB has now been scaled up as the PPSA strategy. ULBs have introduced innovations such as CSR funding for nutritional support, digital adherence, and NGO partnerships for generating awareness. ULBs have further funded equipment such as x-ray machines at the UPHC level. Coordination between ULBs and NHM apparatus, however, requires strengthening with joint planning for funding deficits, data sharing between programs (TB–HIV, vulnerability analysis for ACF events), and leveraging NUHM IEC budgets for TB.

Continuing gaps in managing social determinants. The major gap identified was the limited attempts made to link TB patients with available social welfare schemes, especially those administered by the ULB’s social welfare department and opportunities available under the National Urban Livelihood Mission. The self-help groups managed by the National Urban Livelihood Mission have also not been adequately reached with health messages and interventions. The NUHM has articulated a convergence framework. Also, institutional mechanisms for convergence have been suggested and presented as a facts and questions or FAQ document. The mechanism of the ward coordination committee is being implemented in the city of Bhubaneswar. The committee is chaired by the ward-level elected representative. The members include representatives of the ULB, schools, Integrated Child Development Services scheme, health department, sanitation department, and local NGOs. The committee provides a platform for intersector problem-solving at a decentralized level. Such mechanisms have a potential for impact on the overall demand for health and quality of services. The success of this platform was reviewed (Gopinath et al. 2015) and found that they were leveraging social groups and community level leadership for promoting health-seeking behavior, infrastructure, and monitoring of developmental inputs (including water, sanitation, and hygiene) at the ward level.

⁴ World Health Organization. Commission on Social Determinants of Health. http://www.who.int/social_determinants/en/. (accessed 28 January 2007).

The ward coordination committee in Pune has been addressing issues beyond health, such as stray dogs, traffic jams, and electricity connections. Similarly, in Bhilai, a park was created by the ward coordination committee in an area that was earlier being used for open defecation. Other examples include sanction of funds to build a railing along a canal to prevent accidents, and the establishment of child toilets.

In conclusion, ULB-led innovations are worthy of being scaled up. There is a need for strengthened coordination for planning between the ULBs and the NHM. A structure effort must be made to link TB patients with opportunities that influence the social determinants of their disease.

C. Gaps and Opportunities in Reaching Migrant Populations

Migrants are defined in many ways. The Census of India defines migrant as a person who has moved from one politically defined area to another similar area (Office of the Registrar General and Census Commissioner).⁵ For HIV programming in the country, the revised migrant operation guideline defines migrants as follows: People (both male and female) who move from their place of origin in rural areas (source) to a town or city (destination—irrespective of district, state, country) who:

- (i) return to their place of origin at least once in 6–12 months;
- (ii) move frequently between districts for work purpose;
- (iii) move directly between the places (or) via the transit locations;
- (iv) move either alone or with their partners;
- (v) those returned to places of origin (at source areas); and
- (vi) female spouses of migrants (at source areas).

The migrants are also classified into different types such as source, destination, and transit; in-migration and out-migration; permanent or long-term, and temporary or short-term migration; return migration; and currently active migration.

According to the Indian census 2011, about 309 million people (or 31.2% of Indian population) were reported as migrants, and many more are spending their life as undocumented migrants since there are no registration policies available for migrants. Major migration categories are for work or employment (14.4 million, 14.7%); business (1.1 million, 1.2%); education (2.9 million, 3.0%); and marriage (43.1 million, 43.8%). Migration for livelihood is a growing phenomenon among disadvantaged groups in India. As per the 55th round of the National Sample Survey Organization, there are nearly 30 million migrant workers who migrate every year across India for livelihood (NSSO 2000).

HIV sentinel surveillance finds that migration could be fueling the spread of the HIV epidemic in high out-migration states such as Bihar, Gujarat, Madhya Pradesh, Odisha, Rajasthan, and Uttar Pradesh. Of the 120,000 estimated new infections in 2009, these six high prevalence states accounted for only 39% of the cases. Meanwhile, the states of Bihar, Gujarat, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, and West Bengal accounted for 41% of new infections. Also, data from integrated counseling and testing centers in destination areas such as Thane and Surat have shown a high prevalence of HIV among migrants. The HIV positivity rate among male migrants from Uttar Pradesh tested in Thane's integrated counseling and testing centers was 9.1%, and 7.9% for female migrants. Similarly, the male migrants from Andhra Pradesh tested in Thane had a prevalence of 23.8%, and 16.4% for female migrants. The Ganjam

⁵ Government of India, Ministry of Home Affairs, Office of the Registrar General and Census Commissioner. https://censusindia.gov.in/Census_And_You/migrations.aspx#:~:text=When%20a%20person%20is%20enumerated,he%20is%20considered%20a%20migrant.&text=In%20India%2C%20as%20per%20census,migration%20by%20place%20of%20birth.

migrants tested in Surat also showed high HIV prevalence, with 2.3% among males and 3.5% among female migrants.⁶ The primary destinations for migrants (22% to Maharashtra, 7.8% to Andhra Pradesh, 7% to Gujarat, and 5% to Karnataka) are also states with high HIV prevalence (Saggurti, N., R. Verma et al. 2008). The source sites for migration are largely from Uttar Pradesh, Bihar, and Odisha. Patterns of HIV prevalence conducted among the migrant population in 2011 found that in northern Bihar, migrants accounted for 89% of the HIV-positive group compared to 59% of the HIV-negative group. In Ganjam district, migrants accounted for 79% of the HIV-positive group compared to 41% of the HIV-negative group. These proportions were 73% for the HIV-positive group and 32% for the HIV-negative group in Eastern Uttar Pradesh (Saggurti, N., B. Mahapatra et al. 2011).

Policies for migrants. The NUHM specifically focuses on slum dwellers, other marginalized groups like construction workers, urban migrants, street vendors, and homeless people. NUHM targets the provision of essential primary health care through community involvement. However, about 39% of 1,067 cities implementing NUHM had completed vulnerability mapping, one of the key strategies of NUHM. To address and monitor the migrant workers HIV/AIDS, India established a National HIV and AIDS Policy and the World of Work in 2009, with the ratification of the International Labor Organization Convention No. 111 on Discrimination in respect of Employment and Occupation. This policy statement brings a compressive framework where nondiscrimination against labor workers was made based on their real or perceived HIV status. The National AIDS Control Program has also articulated a migrant strategy, and with support from NGOs, implements targeted interventions for migrant populations. At present, most of the migrant health service is provided by NGOs. Examples include DISHA, which has identified the sites for the establishment of such Anganwadis that are convenient for migrant workers; and Aajeevika Bureau in the Rajasthan state of Udaipur, which provides several services to migrants including registering them into welfare and health programs by issuing identity cards to attain eligibility.

The Inter-state Migrant Workmen Regulation Act, 1979, talks about contractor-led movements of interstate migrant labor and mainly focus on how to prevent exploitation caused by out-of-state contractors. Another law of migrant workers under the Building and Other Construction Workers Act, 1996, aims to improve the quality of life among migrants. Under this act, a considerable amount of funds has been collected by the welfare boards of the construction department for migrants in several states. Migrant issues are viewed as labor issues because of which they are not reflected in many urban plans and services (Bhagat 2012).

Tuberculosis services for migrants very limited. This study finds that the current reach of the NTEP to migrants may be limited, and their access to public services very limited. All states, cities, and UPHCs visited were reaching out to the migrant population with TB interventions. This is mostly in the form of ACF camps organized at the migrant sites, and, to some extent, through HIV/AIDS targeted interventions. However, the exercise of mapping for ACF may be limited by the limited understanding of the UPHC about its vulnerabilities.

Partnerships with nongovernment organizations in reaching migrants not effective. None of the cities had established NGO partnerships to cater to migrant populations exclusively with TB services. They have mandated HIV targeted interventions to include TB messages. However, not all HIV targeted interventions have a TB component, and in states where it is an articulated policy to include TB, the services are sub-optimal. Targeted interventions by NGOs screen and refer presumptive patients to the closest facility. The referrals for HIV are escorted whereas they are not for TB and thus these referrals are not generally successful as the migrant workers are not able to

⁶ Government of India, Ministry of Health and Family Welfare. Migrant Intervention Strategy for National AIDS Control Program IV, National AIDS Control Program. New Delhi.

access UPHCs during working hours. The NGOs are not required to collect a sputum sample when they encounter a presumptive TB patient. NGOs are replete with HIV communication materials, but testing facilities have limited TB material in the form of posters, which are few and in local languages. Workplace intervention is limited to ACF, and reliance on NGOs delivering the HIV targeted interventions to deliver TB services with limited coordination does not result in adequate coverage.

Mapping of migrants limited. Furthermore, there has been an inadequate attempt to coordinate with the labor department to identify migrant workers. Large construction sites, hotels with migrant employees, and small-scale industry workers working in small tenements had not been mapped either by the NUHM functionary or the NTEP functionary. Very few managers at the migrant working sites were aware of the nearest primary health facility.

Also, although NIKSHAY provides the opportunity to identify a patient as a migrant, this data is not carefully filled and hence not available. Patients are reluctant to reveal their migrant status in the fear that services may not be available. In the course of the treatment, when the implementers realize the migrant status of the patient, the information is not updated in the system.

Public facilities do not adequately reach migrants. Awareness about TB and its services was dismal among migrants met by this study team. Health services at the work site cater to work-related injuries. While all migrants were aware of the local tertiary hospital, none were aware of the closest UPHC. Consequently, migrants demonstrated an inclination for using the services of a chemist or a private provider. Management of a patient who is a migrant is also reported as a challenge, although functionaries counsel patients to inform them before migrating.

Innovating to reach migrants. Most global migrant policies focus on integrating the migrant. The initial steps in integrating the migrant are to identify the migrant and then familiarize him or her to the city. A German innovation does this by leveraging technology. “Integrate” is an information app and website tailored to the specific needs of both newcomers as the users of the app and municipal administrations as the content providers. It is a free guide for newcomers. The platform is multilingual, offline, and free. The app passes on all relevant information in multiple languages to the newcomers. It is a holistic service ecosystem for cities, districts, and organizations for the integration of people with a flight or migration background. Similar applications could be developed, piloted by cities to understand the feasibility and effectiveness of these applications in linking migrants to the health and welfare facilities available in the city.

Similarly, an innovation from Australia, Shifra, is not only a lifesaving health intervention, but it is also a research project that aims to explore the social, cultural, and geographic barriers to quality health care access many refugees experience. The Shifra web app is designed to improve access to quality sexual and reproductive health care. It provides local, evidence-based health information in multiple languages for communities with varying levels of language and health literacy. Shifra also directs users to trusted clinics where they can access respectful and safe care.

There is an urgent need to map the migrants in coordination with the HIV program and the labor department; accelerate vulnerability mapping by UPHCs; and develop an information package, linking the migrant to not only health services but also to social and welfare services. It is also paramount that ULBs initiate or devise “city migrant-friendly” initiatives, so that supportive assistance to migrants can be provided.

As a second step, it will be essential to tailor the services to fit the needs of the migrants. This may include the provision of workplace interventions, projects for migrants akin to HIV or leveraging HIV targeted interventions effectively, multilingual communication material, migrant as a liaison or link worker to the migrants, among others. Also, there is a need to articulate a workplace policy for the formal sector, which includes leave policy, especially for MDR patients; and testing and screening policy.

V. RECOMMENDATIONS

Summary of Challenges

Box 3 summarizes the challenges and funding opportunities that the National TB Elimination Program faces.

Box 3: National TB Elimination Program—Summary of Challenges and Funding Opportunities

Challenges

- Continuing lack of awareness about tuberculosis (TB) and its prevention; prevalence of stigma leading to presumptive patients not seeking treatment; and need for tracking the missing cases.
- Communication strategies not responsive to the needs of the communities and patients.
- Lack of coordination between various urban sectors to address unique urban issues such as migration, access to care, familiarization with public health facilities, social safety net for patients, among others.
- Inadequate capacities of community-level functionaries and structures to generate awareness and mobilize utilization of services.
- Meager understanding of the effectiveness of active case finding; inadequate mapping of vulnerabilities to reach “missing” cases.
- Need for additional capacities for decentralized management of patients, especially the side effects.
- Need to implement airborne infection control measures.
- Delays in payment of financial support to patients for supplementing nutrition, which are intended to ensure adherence.
- Need for focus on quality in private providers, including ensuring management of co-morbidities and use of standardized treatment guidelines.
- Inadequate reach of the National TB Elimination Program to migrants, highlighting the need for migrant projects.

Funding Opportunities

- **Information, education, and communication strategies and implementation.** Current information, education, and communication mechanisms focus on generating awareness about symptoms. A massive campaign could be planned for India to learn cough hygiene and sputum disposal. The campaign could leverage social media and develop innovative audio-visual material that can be made viral. Infusion of new communication materials covering key messages; frequently asked questions; and material for patients, communities, and private providers, for interpersonal communication and wider dissemination could be elements of the effort.
- **Private provider engagement projects.** Patient provider support agencies (PPSAs) are expected to end following their project period, and they currently cover a limited number of cities only. There will be a need to scale up PPSA activities in other cities. Beginning this financial year (2020/21) these are now being funded from the National Health Mission budget through the program implementation plans. All PPSAs are envisaged to transition to domestic funding by next financial year (2021/22).
- **Migrant projects.** Specific migrant projects for TB or leveraging HIV targeted interventions for reaching migrants with TB services will require funding for capacity building, nongovernment organization partnerships, and advocacy, communication and social mobilization efforts. Also, the Asian Development Bank support could focus on bringing expertise to support the National TB Elimination Program in articulating a policy for migrants.

Source: Asian Development Bank.

The following recommendations are presented under the following groupings: (i) governance (management of the National TB Elimination Program, financial inputs, convergence and coordination with other programs, migrant strategies); and (ii) technical (recommendations on prevention, detection and diagnosis, treatment and support).

A. Governance

1. Management of the National TB Elimination Program

- **Leverage urban health structures effectively.** The NTEP is mostly driven by TB functionaries in urban areas. There is an urgent need to co-opt MAS and elected representatives of ULBs (Ward Councilors). The role of Health Care Workers and MAS who come in contact with communities must be delineated to include active case finding, preventive activities, patient support, and dissemination of information to new migrants in the communities.
- **Establish an enabling environment for human resources.** The contractual nature of NUHM human resources, with limited benefits and professional growth, is a serious threat to the performance of the program. There is an urgent need to articulate a policy that facilitates competitive remuneration, associated benefits such as medical insurance, and leave policy to avoid attrition and improve performance. States such as Chhattisgarh, Himachal Pradesh, and Odisha have formulated policies for contractual staff that could be explored and adapted by other states.
- **Prioritize training of human resource and competence certification.** Induction training for all NUHM human resources, especially for those who interface with community on daily basis, should be exhaustive. It is critical to assess and certify competence of human resources post-training. Furthermore, a mechanism for continuous post-training support may be established to help the functionaries overcome operational problems. As far as possible, human resources from the private sector and other departments should also be trained. In addition, integrated training for NTEP staff with general health system staff needs to be explored to create better coordination in implementation.
- **Strengthen providers' knowledge.** The untrained or limitedly trained Medical Officers are usually unaware of the latest NTEP guidelines and hence are also oblivious of adverse drug reactions due to TB drugs. Strengthen providers' knowledge in recognition of symptoms, early and correct diagnostic algorithm use, and practice of right treatment practices through repeated sensitization workshops. It may be worthwhile to provide a soft copy of the package of essential services as a ready reckoner (regimen, diagnostic algorithm, DRTB, program management etc.,) specially to Medical Officers. With everyone having a smart phone these days, it shall be easy for a Medical Officer to consult these. An app may also be considered.
- **The Medical Officer as leader.** In the UPHC area, Medical Officers must be provided with comprehensive and regular reports of all activities in his area for possible action. An all-inclusive big picture of TB elimination activities shall make a Medical Officer a better manager. Typically, Medical Officers receive trainings from senior program personnel and medical college faculty; however, involving other centers of excellence such as Indian Institutes of Management, Indian Institutes of Technology, Tata Institute

of Social Sciences, JIPMER etc. can help them develop a more comprehensive skillset, including those around leadership and program management in resource-poor settings.

- ***Provide access to diagnostic services.*** Lack of awareness among communities and location of diagnostic services are the issues that need to be addressed to facilitate early diagnosis. This may also help in getting large number of cases whose reporting remains elusive under the program. In addition, continuous quality improvement in diagnostic laboratories with strong quality management system will improve detection of more cases and encourage patients to visit DMCs instead of secondary or tertiary care facilities. There is also a need for more reference laboratories especially those that rapidly diagnose and swiftly detect resistance through CBNAAT.

2. Financial Inputs

- ***Accelerate patients' linkages with Jan Dhan Yojana accounts.*** Direct bank transfer of Rs500 per month provided to promote intake of nutritious food and compensate for loss of work is yet to become perfect. The process could be accelerated by supporting patients' linkages with Jan Dhan Yojana accounts (zero balance accounts), an activity that could be undertaken by the ULBs as well as NUHM functionaries. Furthermore, the delays emanating from the NIKSHAY platform should be addressed.
- ***Medical Officers should monitor the direct bank transfer.*** Activities on IEC should include advice on using this money to improve the nutrition of the TB patients. Random surveys should be done to assess how direct bank transfer money is used in the community. Medical Officers should also oversee that the informant and the private provider incentives are given on time, to improve reporting of TB cases.

3. Convergence and Coordination with Different Stakeholders

- ***Strengthen the planning process and clearly articulate the roles of individual functionaries.*** While there is ample coordination between the NUHM and the NTEP at the operational level, the collaborative framework should be articulated as an operational guideline. This is to ensure effective implementation and monitor collaboration. Potential roles for NUHM functionaries listed in this report (Table 9) may be considered for implementation.
- ***Link patient provider support agencies.*** PPSAs should act as a link between the NTEP, NUHM, facilities, and the private providers and ensure involvement of the UPHC functionaries.
- ***Strengthen institutional mechanisms.*** Institutional mechanisms are required to ensure the role of ULBs in linking patients to social determinants of health. Alternatively, actionable items should be listed and monitored to ensure that the most vulnerable in the community are linked to social protection schemes. This list is available with NUHM and can be reviewed before being finalized.
- ***Involve stakeholders.*** Ward-level multi-stakeholder coordination should be promoted by NUHM to address social determinants of health at the decentralized level. Local issues require local solutions and actions, which can be facilitated with a ward coordination committee mechanism. Policymakers may consider allocating nominal

funding for ensuring these committees meet and identify problems that need to be resolved by the other sector. In addition, NGOs, community-based organizations, and NGO health care providers should be involved in TB control activities. A role model or champion among successfully treated TB patient groups should be involved in awareness raising.

- **Mainstream tuberculosis control.** TB should be included in the agenda of department meetings and forums; patient support groups should be constituted; and grievance redressal mechanisms should be established.
- **Link diabetes mellitus and tuberculosis.** The co-morbidity of TB with diabetes mellitus requires that the NTEP coordinate with the noncommunicable diseases program and explore the avenue of detecting TB in patients with diabetes mellitus. A roadmap similar to the HIV program may be explored.

4. Address Migrant Health

- **Establish migrant policy for preventing and managing tuberculosis among migrants.** A comprehensive policy should be developed that identifies key stakeholders and their roles, methodology, and data sources for mapping migrants. This should also contain legal provisions for notifying migrant workers to the health sector, workplace interventions and responsibilities, leave policy for patients, comprehensive packages of information, and linkages to social protection schemes.
- **Include HIV targeted interventions.** As a low hanging fruit, ensure that HIV intervention programs are better equipped to prevent, screen, and notify TB. Engage with labor departments to develop a better understanding of migrant worker sites; develop and disseminate information in suitable languages; and link migrants to primary level facilities. In the medium term, consider migrant projects implemented by NGO partners, or consider specific functionaries for managing migrant interventions.
- **Set monitoring mechanisms for migrant interventions.** Develop monitoring mechanisms and ensure that the functionary updates the migrant status of a patient in NIKSHAY based on his or her assessment, upon discovery, and not the patient's response.
- **Partner with labor associations.** Leverage partnership with labor associations to facilitate migrant interventions. Consider a platform in each city for all existing associations for both formal and informal sectors. Build on in-migrant registers that have been developed in states like Uttar Pradesh and Bihar, as is being done during the coronavirus disease (COVID-19) pandemic.
- **Study migrants in major industries.** Migrants who are employed in sectors such as construction, hospitality, garments factory, and other local major industries must be separately studied to develop an in-depth understanding of their challenges and needs.
- **Study migrant workers in the informal sectors.** Informal workers similarly need to be studied by identifying them through labor ministry databases and workers' union memberships. In addition, NGOs, associations of industries, truckers unions etc., can provide valuable information as well as platforms for continuous interactions.

- **Develop migrant-specific communication materials.** These need to be developed to overcome the barrier of language. Materials should be made available to employers, associations, and labor department to help connect the newcomer in the city to available health resources.
- **Conduct swift operations research studies.** In each urban setting, these studies should be undertaken to ascertain the barriers that prevent migrants from seeking healthcare from public facilities, and all identified barriers should be removed as a top priority.

B. Technical

1. Prevention

If the missing cases in India are to be found, the country needs a robust mechanism for generating awareness, removing stigma, and detecting TB among populations generally unreachable by the existing health systems. As private sector notifications increase bringing in a proportion of the missing cases into count, it will be important to develop migrant strategies as well as strengthen participation of the communities in identifying the presumptive patients.

- **Communicate for prevention.** NTEP or NUHM may consider substantial investments in advocacy communication and social mobilization, and facilitate decentralized strategies at the city level. In addition to mass media campaigns and site-based communication strategies (posters), introduce communication strategies for interpersonal interaction; patient-based takeaway communication materials; social media (WhatsApp, Facebook videos) viral campaigns; and other nontraditional media dissemination (folk theater, migrant-specific melas).
- **Engage professional communicators.** The communication strategy needs to be implemented people who are professionals in this area or have been extensively trained. The focus should be on affirmative behavior change. Specific materials need to be developed for promotion of involvement of private medical establishments including laboratories and chemists in general, and private medical practitioners in particular.
- **Craft appropriate messaging.** Messages should not be limited to “symptoms of TB” and “availability of services.” Messages should focus on promotion of cough hygiene and sputum disposal (Spit Free India). Develop patient- or family-specific information packages that help prevent infection transmission, complications, and mortality in the form of answers to FAQs in local languages. Ensure ASHAs and field health functionaries carry copies of these and advocate their use by the community for the prevention of TB, as well as associated factors such as smoking, alcoholism, and malnutrition.
- **Evaluate celebrity endorsements.** The efficacy of currently distributed IEC materials with pictures of national celebrities (e.g., Amitabh Bachchan) must undergo impact evaluation. The messages through IEC materials should be simple, relatable, short, and in the local language, as well as the languages of the mapped migrants. For example, sharing IEC materials in Kannada with migrants from Assam, Jharkhand, Madhya Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal, etc. is counterproductive.

- **Develop migrant-specific communications.** Develop and disseminate migrant-specific information packages that include the location of closest facility, services available, and messages related to important public health issues. Leverage digital technology in the form of software applications and call centers to deliver information packages.
- **Disseminate information on social protection.** Develop and disseminate information packages on available social protection schemes and how to access them.
- **Share success stories.** It may be useful to identify people who have fully recovered with DSTB as well as DRTB, document their stories with good pictures, and disseminate the same with practical suggestions. Short videos of such success stories will motivate patients to seek treatment and adhere to the recommended treatment. In community, these can act as myth busters against the current taboos associated with TB.
- **Spotlight local leadership.** Extensive use of local leaders, TB champions, even folk dancers or artists should be made to communicate with the communities on the need to seek early treatment and compliance with recommended regimen.
- **Undertake capacity building.** Build capacity of ASHAs and ANMs in disseminating key messages, especially that promoting cough hygiene and sputum disposal. Members of MAS need further and repeated orientation in various patient-related aspects and in demystifying the disease to motivate the communities to seek treatment and care. Empower MAS to disseminate key TB messages and leverage them for notifications. NUHM should ensure the implementation of informant incentives for MAS that is available for an identified presumptive patient. Leverage other community-based platforms such as the National Urban Livelihood Mission self-help groups and champions among elected representatives, religious leaders, and cured TB patients for disseminating information.
- **Inculcate prevention in the private sector.** Develop and disseminate IEC materials tailored for private practitioners, including for display in establishments and patient communication.
- **Address social attributes.** TB continues to be a social stigma among all strata of society, especially in the lower economic strata. Newer strategies are required to address stigma in a scientific and systematic way, for integration into the program. Conduct operational research on messages that will address stigma. Consider communicating that the patient becomes noninfectious following a few weeks of being on the regimen.
- **Partner with civil society.** Consider NGOs for IEC campaigns in the communities, especially predominantly migrant communities.
- **Monitor prophylaxis in children.** Monitor indicators for prophylaxis among children and patients on ART to prevent TB among these vulnerable populations.
- **Monitor airborne infection transmission.** Address airborne infection transmission in vehicles of mass transport by studying the current potential for transmission and identifying technical and administrative solutions in the larger context of pandemics. Expedite implementation of the recommended facility-based assessment of airborne infection control measures. Ensure scientific assessment of all facilities for airborne infection control.

2. Detection and Diagnoses

- **Conduct regular analysis on nontreatment-registered cases.** Regularly conduct detailed analysis of the TB diagnosed cases but not registered for treatment in the urban areas. The reasons for missing TB cases need to be found out and corrective action initiated. Analyze the patient cascade of care to find out if “missed” patients are really missing or missing because of poor engagement with the health system.
- **Target at-risk groups.** Re-strategize ACF to ensure that at-risk groups are mapped (or leverage vulnerability mapping being done by the NUHM), repeating the activity periodically. Use a campaign approach to address TB in priority populations. Involve AYUSH (*ayurveda*, *yoga* and *naturopathy*, *unani*, *siddha*, and *homeopathy*) and traditional healers for linkage of priority population.
- **Evaluate active case finding data.** Analyze the data emerging from ACF to develop an understanding of its efficacy. Conduct burden of disease studies based on feasibility, to arrive at a scientific target for the primary level facilities. Monitor the referral rate of presumptive TB patients closely, and support UPHCs that are underperforming.
- **Utilize urban primary health care services.** Develop and implement strategies to increase the use of UPHC services. For every patient belonging to the UPHC area but is diagnosed elsewhere, conduct an information dissemination campaign in the locality to familiarize community members about the services of the UPHC. Increase awareness in the community on TB diagnostic facilities in the program. Consider wall paintings in communities to provide information about the UPHC.
- **Cover extrapulmonary TB patients.** Develop technical strategies to ensure adequate and appropriate samples from extrapulmonary TB patients to ensure diagnosis as well as UDST.
- **Assess radiographic and CBNAAT facilities.** Assess the availability of radiographic and NAAT facilities in every city against current notifications and fund adequate machines to facilitate rapid diagnosis. Document and disseminate the Bengaluru partnership with local radiologists in private providers during ACF, which increase the case detection two times compared to earlier.
- **Carry out molecular tests for TB diagnosis.** Scale up rapid tests for both public and private sectors.
- **Extend free HIV and CBNAAT testing.** Consider linking the private patients to free HIV and NAAT testing as a policy to ensure UDST and appropriate diagnosis.

3. Treatment and Support

- **Manage common side effects.** Build capacities of functionaries in the UPHC to identify and manage common side effects. Explore the feasibility of managing some of the adverse drug reactions among MDR patients at the UPHC level by training the Medical Officer. Equip ASHAs and ANMs with simple solutions (where they exist) for managing common side effects.

- ***Draw up frequently asked questions.*** A set of questions can be identified and answers to FAQs can be developed and disseminated in local languages. All ASHA and field health functionaries should carry copies of these and advocate their use by the community for prevention and management of TB as well as associated factors such as smoking, alcoholism, and malnutrition.
- ***Conduct behavioral studies.*** NTEP may consider commissioning a comprehensive study or hiring health sociologists who can understand patient behavior and suggest measures to bring about a change in the behavior of the patient and the community. In patients who are detected only during ACF, this category of studies can also elicit the factors that prevented the patient from seeking treatment in spite of being symptomatic for several weeks.
- ***Consider alcoholism.*** There is a need to address alcoholism as a public health issue, rather than just a TB-related issue. Policymakers may consider funding the position of Counselor, Social Worker, and Mental Health Professional at the UPHC level as envisaged under the NUHM framework as a first step to addressing this issue. Also, empowering community-level structures such as the MAS and self-help groups can bring about community-level accountability to adherence among alcoholics.
- ***Evaluate information technology.*** Assess the results of digital adherence support mechanisms and expand its implementation across all cities.
- ***Tap medical and social work colleges.*** In cities with a high burden of MDR, it is not possible to manage and support the patients with the current levels of staffing. Leverage the task force mechanism that has been established in the medical colleges and colleges of social work to strengthen support and counseling being provided to these patients.
- ***Resolve Nikshay Poshan Yojana payments and explore corporate social responsibility.*** Resolve issues pertaining to Nikshay Poshan Yojana payments and encourage ULBs and state health departments to introduce CSR-based support to patients' nutritional needs, as is done in Mumbai.
- ***Engage ASHAs as treatment supporters.*** Evaluate the role of ASHAs since most patients are visiting the center for treatment. Retain this role where it works and use alternate means of treatment support such as digital mechanisms in cities where stigma prevents this role.
- ***Improve patient provider support agency and private provider partnerships.*** As notifications from private providers increase, the focus will have to shift to quality of services, including diagnostics, treatment regimen, and management of adverse drug reactions. Furthermore, program managers find that without support from a PPSA it may be challenging to maintain the level of engagement achieved so far. Consider scaling up PPSA and private sector partnerships to set up essential diagnostic facilities. Alternatively, consider additional workforce for managing private sector engagement.

C. Conclusions

The National TB Elimination Program (NTEP) is technically strong, but the focus has been on detection, diagnosis, and treatment. There are underlying factors creating obstacles in its implementation, including deficiencies in management; inadequate communication with TB patients and/or beneficiaries; and suboptimal efforts to address social factors, especially stigma associated with TB. This study documented the impact of these factors and lined up recommendations for consideration by the program.

The study also highlights the gaps in reaching migrant populations for not only TB care but overall health care. With the emergence of novel diseases in recent years, it will be imperative to articulate a comprehensive strategy for addressing migrant health needs, especially to prevent and manage TB. The urban milieu complicates this implementation owing to lack of cohesion in the communities and multiplicity of agencies and interventions. The NUHM has clearly articulated a convergence framework that will need to be implemented with concerted efforts to address urban complexities in delivering health services. To achieve the goal of eliminating TB by 2025, the NTEP will have to reassess its strategies to reach the missing cases. We hope that this study and its recommendations contribute to developing responsive strategies.

APPENDIX 1: SAMPLED RESPONDENTS AND QUANTITATIVE ELEMENTS ANALYZED

Table A1.1: Sample Size for Objective 1

	Respondent Category	Tool Used	No. per UPHC	No. per City (2 UPHCs)	No. per State (2 cities)	Total (3 states)
1	Patients	FGD	1 FGD (10–12 patients)	2 FGDs (20–24 patients)	4 FGDs (40–48 patients)	12 FGDs (120–144 patients)
2	ASHAs	FGD	1 FGD (8–10 ASHAs)	2 FGDs (20–24 ASHAs)	4 FGDs (40–48 ASHAs)	12 FGDs (120–144 ASHAs)
3	MAS	FGD	1 FGD (8–10 MAS members)	2 FGDs (20–24 MAS members)	6 FGDs (40–48 MAS members)	12 FGDs (120–144 MAS members)
4	Auxiliary Nurse Midwives	IDIs	2	4	8	24
5	Medical Officers	IDIs	1	2	4	12
6	Laboratory Technician of the Designated Microscopic Center	IDIs	1	2	4	12
7	TB Health Visitor and/or Supervisor	IDIs	1	2	4	12
8	City Manager and/or Program Manager, National Urban Health Mission	IDIs	—	1	2	6
9	Designated Revised National TB Control Program Officer for the city	IDIs	—	1	2	6
10	Private Providers	IDIs	2	4	8	24
11	Other stakeholders (National AIDS Control Organization officials, nongovernment organizations, developmental partners working in TB control)	IDIs		2–3	4–6	12–18

— means 0, as these officers are not available at this level.

ASHA = Accredited Social Health Activist, IDIs = in-depth interviews, FGD = focus group discussion, MAS = *mahila arogya samiti* (women's health committee), no. = number, TB = tuberculosis, UPHC = urban primary health center.

Source: Asian Development Bank.

Table A1.2: Sample Size for Objective 2

	Respondent Category	Tool Used	No. per UPHC	No. per City (2 UPHCs)	No. per State (2 cities)	Total (3 states)
1	Patients	FGD	1 FGD (10–12 patients)	2 FGDs (20–24 patients)	4 FGDs (40–48 patients)	12 FGDs (120–144 patients)
2	Auxiliary Nurse Midwives	IDIs	2	4	8	24
3	Laboratory Technicians	IDIs	1	2	4	12
4	Medical Officers	IDIs	1	2	4	12
5	Municipal Health Officer	IDIs	—	1	2	6

— means 0, as these officers are not available at this level.

IDIs = in-depth interviews, FGD = focus group discussion, no. = number.

Source: Asian Development Bank.

Table A1.3: Sample Size for Objective 3

	Respondent Category	Tool Used	No. per UPHC	No. per City (2 UPHCs)	No. per State (2 cities)	Total (3 states)
1	Migrants or Migrant Workers	FGD	1 FGD (10–12 patients)	2 FGDs (20–24 patients)	4 FGDs (40–48 patients)	12 FGDs (120–144 patients)
2	Auxiliary Nurse Midwives	IDIs	2	4	8	24
3	Laboratory Technicians	IDIs	1	2	4	12
4	Medical Officers	IDIs	1	2	4	12
5	Other stakeholders such as Workplace Health Officer, Workplace Supervisor, migrant intervention NGO representatives, National AIDS Control Program officers	IDIs	—	4–6	8–12	16–24

— means 0, as these officers are not available at this level.

IDIs = in-depth interviews, FGD = focus group discussion, no. = number.

Source: Asian Development Bank.

Table A1.4: Elements of Quantitative Data Analyzed

	Indicator
1	Proportion of urban primary health centers that are designated microscopic centers
2	Availability of radiographic and cartridge-based nucleic acid amplification test facilities
3	Proportion suspected as patients and referred for diagnosis
4	Notified in Nikshay Poshan Yojana, public and private
5	Notification compared to target
6	Contact tracing
7	Receiving Direct Bank Transfer support and its timeliness
8	Treatment success: public and private
9	Private providers collaborating
10	Patients treated for latent TB
11	Patients with TB and human immunodeficiency virus co-infection
12	Proportion of patients with drug-resistant TB
13	Proportion of patients who have undergone drug sensitivity test
14	Proportion of patients with co-morbidities such as diabetes
15	No. of active case finding efforts, screening events for vulnerable population, awareness events
16	Training status of National Urban Health Mission and urban local body staff
17	Data of migrant patients at source sites
18	Number of migrants at the site
19	Source and transit site of migrants
20	Number of patients identified as migrants presenting with TB symptoms at the associated public health facility

TB = tuberculosis.

Source: Asian Development Bank.

APPENDIX 2: TOOLS FOR THE QUALITATIVE ASSESSMENT

Pointers for the Focus Group Discussion

Recorder should keep notes by making cards for each section. Note responses on each respondent's card by numbering them as R-1 from the left of the facilitator and going clockwise around the room. Note if participants seem to all be agreeing with a statement or if there is a visible disagreement among participants when someone is speaking. Write down any quotes on a separate sheet provided for quotes. Note the quotes that are emphatic, well-articulated, and which summarize the general feelings of the group for a particular topic. Responses during the introduction (all questions from introduction of facilitators through participant introductions) can be grouped together.

Pointers after Conducting the Focus Group Discussion

Immediately after the focus group discussion (FGD) session, the facilitators should

- (i) review the notes for clarity and understanding,
- (ii) compare and record observations about the group not readily clear from the notes,
- (iii) discuss and record any insights or ideas that the interview created while they are fresh in your mind, and
- (iv) prepare a summary of the FGD for your team.

Table A2.1 is the guide for the facilitators.

Table A2.1: Focus Group Discussion—Topic Guide for Tuberculosis Patients

Topic	Discussion and Transitions
Introduction and greeting	Facilitator's and Observer's name, appropriate greetings
Purpose of FGD	We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. Since you are a TB patient, your ideas and feelings can help us understand how the current services are performing, to inform us about changes that we can incorporate to improve TB care. May we begin the discussion? (Allow for those who do not want to participate in the discussion to leave).
No right or wrong answers	We would just like to know your frank opinion. There is no right or wrong answer to any of the questions. This is not a test. We just want to learn from you.
Length of time	The discussion would take about an hour and a half.
Talking to one another	As we will be discussing about each of your opinions, it will be important that we do not talk all at once because we will want to hear each other, so we should not talk together. Everybody should try and participate, and everybody will be given a chance to put forth their views. If you have any queries they would be addressed at the end.
Explain note-taking and secure confidentiality consent	(Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object? We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and the discussion will remain confidential. If you consent, please sign this consent form.

continued on next page.

Table A2.1 *continued*

Topic	Discussion and Transitions
Checking understanding; clarifying	Does everyone understand what I have said? Does anyone have any question?
Participant introductions (warm-up)	Please introduce yourselves. Let us begin.
General	<ul style="list-style-type: none"> • Did you know about TB before you contracted it? • When do we say that a person is suffering from TB? • Do you know of any others who have suspected TB either in your family or in your community? • Have these people sought care or are on treatment? If yes, from where?
Knowledge	<ul style="list-style-type: none"> • How is TB caused? • What are the main symptoms of TB? • How does TB spread? • What can be done to control the spread of TB? (Explore for cough hygiene) • Can TB be cured? • What can be done to cure TB? • Have you heard of HIV? • What is the association between TB and HIV? • Can TB be cured in people with HIV? • Have you heard of MDR TB? Why is it caused? Can this be prevented? • What happens when the TB patient has diabetes, hypertension, or other such diseases?
Access to care	<ul style="list-style-type: none"> • How many days of having the symptoms did you seek care? (If response indicates a delay-seeking pattern then ask, When should you have sought care?) • Whom did you approach for diagnosis and treatment? • Why did you choose this particular facility or provider? (If the interviewee prefers a private provider then ask, Why did you not access a government facility?) • What was done to diagnose TB? (Probe for various tests) • What additional information did you receive from the provider? • After being diagnosed with TB, how long did it take you to start the treatment? • Did you face any problems in treatment? Describe the problems. (distance, time, loss of wages, side effects, drug shortage, behavior of staff, etc.) • Did you receive treatment for your co-morbidities? • Do women in your community seek care the same way as men? • Have your family members been screened for TB? • Have they been provided any treatment following the screening?
Adherence to treatment	<ul style="list-style-type: none"> • How long did your treatment last? (If still on treatment, how long have you been taking the medicines?) • How long does it take to cure the disease? • Can treatment be stopped if you are feeling better? • What happens when the treatment is not completed? • How often do you take the medicine? What happens when you forget to take medicine? • When do you think the patient is called as cured? • What are the symptoms of being cured? • Have you ever stopped taking your medicines or know of a person who has? • If so, what were the reasons? • Is there anyone who supports you to take treatment? • If yes, what has been this person's role? • Did you have to undergo any tests during treatment, how many times and why? • Have you received any incentives to complete your treatment? • If yes, have you received them in a timely manner? (If not, seek details for the delay)

continued on next page.

Table A2.1 *continued*

Topic	Discussion and Transitions
Stigma associated with TB	<ul style="list-style-type: none"> • What reactions did you face once family and friends came to know of your tubercular status? Please describe. • (If there is a cured patient in your group) Would you feel comfortable talking to others about your success in cure?
IEC/BCC	<ul style="list-style-type: none"> • Has someone ever shared any information regarding TB with you? If yes, please describe some of the IEC material that you may have seen? • Have you received any counseling or attended any talks about TB? If yes, please describe what was discussed during these talks.
Questions on migration	<ul style="list-style-type: none"> • Is there anyone in the group who has migrated recently and plans to migrate out? • Did you face any challenges because of your migrant status? • What was the source of your information when you wanted to seek care for your symptoms? • If you are migrating out, do you know where will you seek and continue your TB care at the destination site? • If yes, what was the source of this information? • If no, have you informed your provider about your intention to migrate out?
Satisfaction with TB control services	<ul style="list-style-type: none"> • What were some of the things about the services provided by your facility or provider that you did not like? • What did you like about the services? • (If seeking services from a public facility) Does someone from the facility get in touch with you? • If so, who gets in touch and how often? • Do you know the Accredited Social Health Activist in your community? • Do you know the MAS (women's health committee) members in your community? • Do you seek their support for your TB treatment? If yes, what support have you received? If no, why not?
Challenges	<ul style="list-style-type: none"> • Please share any other challenges that you have faced in seeking treatment and remaining on treatment, which we may have not discussed?
Summary	Mention main themes discussed and participant's responses.
Closure	Thank you for your time. Do you have any questions that you would like to ask? I am not sure that I will be able to answer all of them, but I will try (Record all questions and do not lecture)

ASHA = Accredited Social Health Activist; BCC = Behavior Change Communication; FGD = focus group discussion; IEC = information, education, and communication; MAS = *mahila arogya samiti*; MDR = multidrug-resistant TB; no. = number; TB = tuberculosis.

Source: Asian Development Bank.

Table A2.2: Focus Group Discussion—Topic Guide for Migrants and Migrant Workers

Topic	Discussion/Transitions
Introduction and greeting	Facilitator's and Observer's name, appropriate greetings
Purpose of FGD	We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. Since you are a migrant and new to this area, your ideas and experiences about seeking health care, especially for TB, can help us understand how the current services are performing and inform us about any changes that we can incorporate to improve TB care. May we begin the discussion? (Allow for those who do not want to participate in the discussion to leave)
No right or wrong answers	We would just like to know your frank opinion. There is no right or wrong answer to any of the questions. This is not a test. We just want to learn from you.
Length of time	The discussion would take about an hour and a half.
Talking to one another	As we will be discussing about each of your opinions, it will be important that we do not talk all at once because we will want to hear each other, so we should not talk together. Everybody should try and participate, and everybody will be given a chance to put forth their views. If you have any queries they would be addressed at the end.
Explain note-taking and secure confidentiality consent	(Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object? We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and the discussion will remain confidential. If you consent, please sign this consent form.
Checking understanding; clarifying	Does everyone understand what I have said? Does anyone have any question?
Participants introductions (Warm up)	Please introduce yourselves. Let us Begin.
General	<ul style="list-style-type: none"> • Where did you migrate from? • When did you migrate? Do you plan to stay here or do you intend to migrate back? • Why did you migrate? • What is your occupation? • What do you do when you fall sick? • Do you know anyone who has had TB? • Is there a health facility at your workplace? If not, which is the closest health facility to you? • Which is the closest government facility to you? • Did you face any challenges because of your migrant status? • What was the source of your information when you wanted to seek care for your symptoms? • If you are migrating out, do you know where will you seek and continue your care at the destination site? If yes, what was the source of this information? If not, have you informed your provider about your intention to migrate out?
Knowledge	<ul style="list-style-type: none"> • How is TB caused? • What are the main symptoms of TB? • How does TB spread? • What can be done to control the spread of TB? (Explore for cough hygiene) • Can TB be cured? • What can be done to cure TB? • Have you heard of HIV? • What is the association between TB and HIV? • Can TB be cured in people with HIV? • Have you heard of MDR TB? Why is it caused? Can this be prevented?

continued on next page.

Table A2.2 *continued*

Topic	Discussion/Transitions
Access to care	<ul style="list-style-type: none"> • What happens when someone in your community suffers from TB? When do they seek care? What is the time between the occurrence of symptoms and seeking care? (If response indicates a delay-seeking pattern) When do you think they should have sought care? • Who do they approach for diagnosis and treatment? • Why did they choose this particular facility or provider? • (If the interviewee reports a private provider, then ask, Why did this person not access a government facility?) • (If aware of the public facility) How far is the UPHC or public facility to you? Have you ever visited this facility for reasons of illness? • Did you face any problems in treatment? Describe the problems (distance, time, loss of wages, side effects, drug shortage, behavior of staff, etc.) • Do you know how TB is diagnosed? What tests are done? • Are you aware that TB drugs are available free of cost at the government facility? • Do women in your community seek care the same way as men? • Have your family members been screened for TB? • Have they been provided any treatment following the screening?
Adherence to treatment	<ul style="list-style-type: none"> • Do you know how long does the treatment of TB last? How long does it take to cure the disease? • Can treatment be stopped if you are feeling better? • What happens when the treatment is not completed? • How often must one take the medicine? What happens when you forget to take the medicine? • When do you think the patient is called as cured? • What are the symptoms of being cured? • Do you know of any person who has stopped taking the medicines? • If so, what were the reasons?
Stigma associated with TB	<ul style="list-style-type: none"> • If a member of your household became ill with TB, would you want it to remain secret? • Some people think that TB patients deserve the illness that they have. Do you agree with this point of view? • What reactions would you face if family and friends came to know that you had TB? Please describe. • (If there is a cured patient in your group) Would you feel comfortable talking about your success in cure to others?
IEC/BCC	<ul style="list-style-type: none"> • Has someone ever shared any information regarding TB with you? If yes, please describe some of the IEC material that you may have seen. • Have you received any counseling or attended any talks about TB? If yes, please describe what was discussed during these talks.
Satisfaction with TB control services	<ul style="list-style-type: none"> • What were some of the things about the services provided by your facility and/or provider that you did not like? • What did you like about the services? • (If seeking services from a public facility) Does someone from the facility get in touch with you? • If so, who gets in touch and how often? • Do you know the Accredited Social Health Activist in your community? • Do you know the MAS (women's health committee) members in your community? • Do you seek their support when ill? If yes, what support have you received? If not, why not?
Challenges	<ul style="list-style-type: none"> • Please share any other challenges that you have faced in seeking treatment and remaining on treatment that we may have not discussed.
Summary	Mention main themes discussed and participant's responses.
Closure	Thank you for your time. Do you have any questions that you would like to ask? I am not sure that I will be able to answer all of them, but I will try (Record all questions and do not lecture)

BCC = Behavior Change Communication; FGD = focus group discussion; IEC = information, education, and communication; MAS = *mahila arogya samiti*; MDR = multidrug-resistant TB; no. = number; TB = tuberculosis.

Source: Asian Development Bank.

Table A2.3: Focus Group Discussion—Topic Guide for *Mahila Aarogya Samiti* Members

Topic	Discussion/Transitions
Introduction and greeting	Facilitator's and Observer's name, appropriate greetings
Purpose of FGD	We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. Since you are members of the MAS, your ideas and opinions can help us understand how the current services are performing and inform us about any changes that we can incorporate to improve TB care. May we begin the discussion? (Allow for those who do not want to participate in the discussion to leave).
No right or wrong answers	We would just like to know your frank opinion. There is no right or wrong answer to any of the questions. This is not a test. We just want to learn from you.
Length of time	The discussion would take about an hour and a half.
Talking to one another	As we will be discussing about each of your opinions, it will be important that we do not talk all at once because we will want to hear each other, so we should not talk together. Everybody should try and participate, and everybody will be given a chance to put forth their views. If you have any queries they would be addressed at the end.
Explain note-taking and secure confidentiality consent	(Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object? We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and the discussion will remain confidential. If you consent, please sign this consent form.
Checking understanding; clarifying	Does everyone understand what I have said? Does anyone have any question?
Participants introductions (warm-up)	Please introduce yourselves. Let us begin.
General	<ul style="list-style-type: none"> • When was this group constituted? • Why did you join the group? • Name some activities of your group • Have you heard of TB? • When do we say that a person is suffering from TB? • Do you know of anybody in your family or in your community who has TB? • Have these people sought care or are on treatment? If yes, from where?
Knowledge	<ul style="list-style-type: none"> • How is TB caused? • What are the main symptoms of TB? • How does TB spread? • What can be done to control the spread of TB? (Explore respondent's cough hygiene) • Can TB be cured? • What can be done to cure TB? • Have you heard of HIV? • What is the association between TB and HIV? • Can TB be cured in people with HIV? • Have you heard of MDR TB? Why is it caused? Can this be prevented? • What are the problems when TB patients also suffer from diabetes or similar such condition?

continued on next page.

Table A2.3 *continued*

Topic	Discussion/Transitions
Access to care	<ul style="list-style-type: none"> • When should a person with suspected TB symptoms seek care? In your community when do people generally do so? • Whom do the patients generally approach for diagnosis and treatment? • Why this particular provider? • (If the interviewee prefers a private provider) Why don't they access a government facility? • Is there a TB provider (this may be a private doctor, or a community worker) near your house? • What is generally done to diagnose TB? (Probe for various tests) • What are the problems faced to get diagnosis and treatment? • Do women in your community seek care the same way as men? • Should family members of a patient be tested for TB as well?
Adherence to treatment	<ul style="list-style-type: none"> • What is the cure for TB? • How long does it generally take for TB to be cured? • Can treatment be stopped if one is feeling better? • What happens when the treatment is not completed or irregular? • When do you think the patient is called as cured? • What are the symptoms of being cured? • Do you know of any patient who did not complete the treatment? • If so, what were the reasons for stopping medication? • Do TB patients in your community receive any support to complete their treatment from anyone? • If yes what has been this person's role? • Do patients receive any incentives to complete treatment?
Stigma associated with TB	<ul style="list-style-type: none"> • How do you feel when you hear that a family or a community member has contracted TB? • How does the community generally socially treat a TB patient?
IEC/BCC	<ul style="list-style-type: none"> • Has someone ever shared any information regarding TB with you? (If yes, name the source of information) • Please describe some of the IEC material you may have seen. • Have you received any counseling or attended any talks about TB? (If yes, please describe what was discussed during these talks)
Role of the MAS (women's health committee)	<ul style="list-style-type: none"> • Was TB covered during your induction program? (Move to next question if induction not done) • Has the Accredited Social Health Activist, the Auxiliary Nurse Midwife, or the Medical Officer of the urban primary health center oriented you on your role in TB control? • If yes, can you describe your expected role? (Probe for active case finding) • If no, what role do you think you can play to control TB? • Please describe any community-level action that you may have undertaken to prevent and control TB in your area. • Would you like to learn more about TB?
Summary	Mention main themes discussed and participants' responses. Is there anything else that we talked about that I forgot to mention?
Closure	Thank you for your time. Do you have any questions that you would like to ask? I am not sure that I will be able to answer all of them, but I will try. (Record all questions and do not lecture)

BCC = Behavior Change Communication; FGD = focus group discussion; IEC = information, education, and communication; MAS = mahila arogya samiti; MDR = multidrug-resistant TB; no. = number; TB = tuberculosis.

Source: Asian Development Bank.

Table A2.4: Focus Group Discussion—Topic Guide for Accredited Social Health Activists

Topic	Discussion/Transitions
Introduction and greeting	Facilitator's and Observer's name, appropriate greetings
Purpose of FGD	We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable population. Since you are a TB patient, your ideas and feelings can help us understand how the current services are performing, to inform us about changes that we can incorporate to improve TB care. May we begin the discussion? (Allow for those who do not want to participate in the discussion to leave).
No right or wrong answers	We would just like to know your frank opinion. There is no right or wrong answer to any of the questions. This is not a test. We just want to learn from you.
Length of time	The discussion would take about an hour and a half.
Talking to one another	As we will be discussing about each of your opinions, it will be important that we do not talk all at once because we will want to hear each other, so we should not talk together. Everybody should try and participate, and everybody will be given a chance to put forth their views. If you have any queries they would be addressed at the end.
Explain note-taking and secure confidentiality consent	(Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object? We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and the discussion will remain confidential. If you consent, please sign this consent form.
Checking understanding; clarifying	Does everyone understand what I have said? Does anyone have any question?
General	<ul style="list-style-type: none"> • Since when have you been involved with the UPHC as an ASHA? • What kind of training have you received since your appointment as ASHA? (List formal and informal capacity-building events) • Have you received any orientation or attended any talks about TB? (If yes, please describe what was discussed during these talks) • Name some of the activities you perform. (Probe for active case finding)
TB control role	<ul style="list-style-type: none"> • Do you support TB control activities? • Since when have you been supporting TB activities? • What are activities you support? (Probe for generating awareness, referring or escorting patients to UPHC or DMC, supporting completion of treatment, follow up with patients, default retrieval, counseling of family members, follow up for side effects, follow up on patient incentives, working with the private providers) • (If ASHA supports treatment observation) How many patients do you support?
Knowledge	<ul style="list-style-type: none"> • How is TB caused? • When do we say that a person is suffering from TB? • What are the main symptoms of TB? • How does TB spread? • What can be done to control the spread of TB? (Probe for cough hygiene) • (If cough hygiene is mentioned) Could you tell me a little more about that, what you would advise a patient on cough hygiene? • Can TB be cured? • What can be done to cure TB? • Have you heard of HIV? • What is the association between TB and HIV? • Can TB be cured in people with HIV? • Have you heard of MDR TB? Why is it caused? Can this be prevented? • What special care is taken when a patient has other co-morbidities?

continued on next page.

Table A2.4 *continued*

Topic	Discussion/Transitions
Access to care	<ul style="list-style-type: none"> • When should a person with suspected TB symptoms seek care? In your community when do people generally do so? • Whom do the patients generally approach for diagnosis and treatment? • Why this particular provider? • (If the interviewee prefers a private provider) Why don't they access a government facility? • What is generally done to diagnose TB? (Probe for various tests) • What are the problems faced to get diagnosis and treatment? What can be done to address these problems? • Do women in your community seek care the same way as men? • Should family members of a patient be screened for TB? • If yes, are there any challenges to screening the family members?
Adherence to treatment	<ul style="list-style-type: none"> • What is the cure for TB? • How long does it generally take for TB to be cured? • Can treatment be stopped if one is feeling better? • What happens when the treatment is not completed or irregular? • When do you think the patient is called as cured? • What are the symptoms of being cured? • Do you know of any patient who did not complete the treatment? • If so, what were the reasons for stopping medication? • What actions did you take to ensure that the patient continues and completes the treatment? • Do patients receive any incentives to complete treatment? • Tell us some of the barriers faced in completing treatment. • What can be done to address this?
Stigma associated with TB	<ul style="list-style-type: none"> • How do you feel when you hear that a family or a community member has contracted TB? • How does the community generally socially treat a TB patient? • What can be done to ensure that TB patients are not socially shunned?
IEC and/or BCC	<ul style="list-style-type: none"> • Has someone ever shared any information regarding TB with you? If yes please describe some of the IEC material you may have seen. • Do you have any IEC material on TB
Challenges	<ul style="list-style-type: none"> • What are some of the challenges faced by your community in seeking TB care? (Probe for social, economic, and facility-based challenges) • What are the challenges you face in carrying out TB control activities? • What additional support do you require to carry out these activities effectively? (Probe for training, IEC material)
Summary	Mention main themes discussed and participants' responses. Is there anything else that we talked about that I forgot to mention?
Closure	Thank you for your time. Do you have any questions that you would like to ask? I am not sure that I will be able to answer all of them, but I will try (Record all questions and do not lecture)

ASHA = Accredited Social Health Activist; BCC = Behavior Change Communication; FGD = focus group discussion; IEC = information, education, and communication; MDR = multidrug-resistant TB; no. = number; TB = tuberculosis.
Source: Asian Development Bank.

Appendix 2C.1: In-Depth Interview—Guide for Auxiliary Nurse Midwives

Name of the Interviewer _____

Date _____

Namaste

Introduce Self

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Questions

Location and name of facility _____

Name of the interviewee and designation _____

Total months of association with the facility _____

Regular or contractual _____

Population covered by the Auxiliary Nurse Midwife _____

Slum population covered by the Auxiliary Nurse Midwife _____

1. What are your main duties in this facility?
2. What proportion of your time is spent in TB-related activities (counseling, community outreach, follow-up, reporting and/or active case finding)
3. Were you given any training to carry out TB control activities? If yes when, what training, and who conducted this training? What was your experience in this training?
4. What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.

Now I would like to ask you some technical questions.

5. When do you suspect TB in a patient?
6. What is done when you suspect TB in a patient?
7. Could you tell the criteria by which TB patients are classified into various categories?
8. What are the common side effects of the ATT medicines?
9. When you meet a symptomatic patient or one initiated on treatment, what information do you generally give to these patients? (Probe for cough hygiene, screening of family members).
10. What IEC material is available with you? Are they useful? Do you want to suggest some modifications to the material available?

11. Is it a norm to identify a treatment supporter for every patient who is registered for treatment?
12. Are you required to go to the community for follow-up or TB extension activities? If yes, please describe your community-level activities.
13. What is your role in identifying a supporter and following up on default?
(Without probing, ascertain whether the provider is involved in counseling as well).
14. What special care is taken when a TB patient has other co-morbidities?
15. Are there any reporting requirements? Do you capture symptomatic patients in the community-based assessment checklist forms? If yes, what is done with the information?
16. Do you receive a target for notification? If yes, what is the target for this facility? Did you reach the target last year? What are the challenges in notifying TB?
17. Are you aware of latent TB? Do you have any latent TB patients under treatment currently? How many latent TB patients were treated last year?
18. Who supervises your TB-related work? When did you last receive a supervisory visit? Please enumerate what your supervisor checks when he or she visits you. Did you receive any feedback? Was it useful?
19. Who supports you at the community level for TB control activities? Are there any nongovernment organizations for TB control in your area? If yes, describe the activities.
20. Are you required to work with private providers to control TB? If yes, describe the activities.
21. Please describe some key problems faced to control TB, and what can be done to overcome these problems.
22. Do you have any questions for me? I am not sure that I will be able to answer all of them, but I will try.

Thank you indeed for your time.

Appendix 2C.2: In-Depth Interview—Guide for Laboratory Technicians

Name of the Interviewer _____

Date _____

Namaste

Introduce Self

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes. It will also involve an assessment of your facility and review of TB data from your facility.

We anticipate the discussion to take about one hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Location _____

Attached to a facility or laboratory _____

Name of the Interviewee _____

Total months of association with the facility or laboratory _____

Total months in the current position _____

1. Please describe your role as a Laboratory Technician. How many labs do you monitor and support?
2. What proportion of your time is spent on each of the following TB control activities?
 Actual laboratory work _____
 Reporting _____
 Other responsibilities _____
3. What is the current load of disease in your area? Is it increasing or decreasing?
4. Please describe some of the difficulties you face in implementing the program and possible solutions, such as the following:
 Case notification
 Case detection
 Diagnosis
 Laboratory functioning
 Treatment
 MDR TB
 Budgets
 Information management
5. What trainings have you received to carry out TB screening and efficient laboratory management? Who conducted these trainings?

6. What was your experience in the training? What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.

Now I would like to ask you some technical questions.

7. When does one suspect TB in a patient?
8. What is done when one suspects TB in a patient? How is the patient investigated?
9. What are the facilities available in your city to diagnose suspected TB patients?
(Probe for sputum testing, drug sensitivity testing, radiological services, and CBNAAT facility)
10. Could you relate the criteria upon which TB patients are classified into various categories?
11. What additional support is required in the district to diagnose patients?
12. Please describe how you coordinate activities and what support do you get from the following:
 Medical Officer of the facility
 TU incharge
 TB Health Volunteer
 District/City TB officer
 Auxiliary Nurse Midwife
 Accredited Social Health Activist
13. (If facility is not a UPHC) Name the functionaries you coordinate with. What are the issues that you coordinate with these functionaries?
14. How is the internal quality assessment done? How frequently is this done?
What problems do you face in carrying out internal quality assessment?
15. How is the external quality assessment done? How frequently is this done?
What problems do you face in carrying out internal quality assessment?
16. Is the availability of equipment, infrastructure, and consumables adequate in the district labs?
Do you face any problems in this regard?
17. What reporting formats are you required to submit? Did your training have sessions on formats? Have you received training in NIKSHAY?
What are the challenges you face with working on NIKSHAY?
18. Who supervises your work? When did you last receive a supervisory visit? Please enumerate what your supervisor checks when he or she visits you. Did you receive any feedback?
Was it useful? Describe the support you receive from the NTP.
19. Do you get referrals from the private providers? If yes, how many private providers in your area are regularly referring patients for microscopy?
20. Is there an effort to involve private providers? Please describe your experiences (difficulties and innovative ideas if any)
21. Do the activities at city level undergo any review? If yes, how often and who are the participants in the review?
22. What is the additional support you need to function effectively? Please share any other challenges that we may not have discussed.
23. Do you have any questions for me? I am not sure that I will be able to answer all of them, but I will try.

Thank you indeed for your time.

Appendix 2C.3: In-depth Interview—Guide for the TB Health Volunteer Supervisor

Name of the Interviewer _____

Date _____

Namaste**Introduce Self**

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Location _____

Attached to TB Unit _____

Name of the interviewee _____

Total months of association with the TB Unit _____

Total months in the current position _____

1. What are your main duties as a TB Health Volunteer Supervisor?
2. What proportion of your time on each of these activities: counseling, community outreach, follow-up, reporting, active case finding
3. What trainings have you received? When was the last training you received? Who conducted this training? What was your experience in this training?
4. What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.

Now I would like to ask you some technical questions.

5. When do you suspect TB in a patient?
6. What is done when you suspect TB in a patient?
7. Could you tell the criteria by which TB patients are classified into various categories?
8. What are the common side effects of the ATT medicines?
9. When you meet a symptomatic patient or one initiated on treatment, what information do you generally give to these patients? (Probe for cough hygiene, screening of family members).
10. Is it a norm to identify a treatment supporter for every patient who is registered for treatment?
11. Please describe your community level activities.
12. What is your role in identifying a supporter and following up on default?
(Without probing, ascertain whether the provider is involved in counseling as well).

13. What are the reporting requirements? Have you received any training in reporting?
Do you need additional training in reporting?
14. Do you receive a target for notification? If yes, what is the target for this TU? Did you reach the target last year? What are the challenges in notifying TB?
15. Are you aware of latent TB? Do you have any latent TB patients under treatment currently?
How many latent TB patients were treated last year?
16. Who supervises your TB-related work? When did you last receive a supervisory visit?
Please enumerate what your supervisor checks when he or she visits you.
Did you receive any feedback? Was it useful?
17. How many peripheral health interface (PHI) institutions are there in your coverage area?
What support do you receive from these PHIs in performing your role? What is the support you receive from the UPHCs? (Specifically list the support received from the Medical Officers, Auxiliary Nurse Midwives, Laboratory Technician, and the Accredited Social Health Activists)
18. Who supports you at the community level for TB control activities? Are there any nongovernment organizations for TB control in your area? If yes, describe the activities.
19. Are you required to work with private providers to control TB? If yes, describe the activities.
Describe the challenges in working with the private providers.
20. Please describe some key problems faced to control TB, and tell us what can be done to overcome these problems.
21. Do you have any questions for me? I am not sure that I will be able to answer all of them, but I will try.

Thank you indeed for your time.

1. What are your main duties in this facility?
2. What proportion of your time is spent in TB-related activities such as screening, treatment, counseling, community outreach, follow-up, reporting
3. Were you given any training to carry out TB control activities? If yes, when, what training, and who conducted this training? (Probe for Nikshay Poshan Yojana training)
4. What was your experience of this training? What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.
5. If the facility is not a DMC, which is the closest DMC? Where do you refer your patients for radiology and cartridge-based nucleic acid amplification testing?

Now I would like to ask you some technical questions.

6. When do you suspect TB in a patient?
7. What is done when you suspect TB in a patient?
8. Could you tell the criteria by which TB patients are classified into various categories?
9. What additional support is required in this facility to diagnose patients?
10. What are the common side effects of the ATT medicines?
11. When you attend to a suspected patient and after you initiate treatment, what information do you generally give to your patient? (Probe for cough hygiene, screening of family members)
12. What special care is taken when a patient has other co-morbidities?
13. What IEC material is available with you? Are they useful? Do you want to suggest some modifications to the material available?
14. Is it a norm to identify a treatment supporter for every patient who is registered for treatment?
15. Are you required to go to the community for follow up or TB extension activities? If yes, please describe your community-level activities.
16. What is the strategy for active case finding?
17. What is your role in identifying a supporter and following up on default? (Without probing, ascertain whether the provider is involved in counseling as well)
18. What is your role in drug management (maintaining adequate drug supply) and laboratory management? (If a laboratory is attached to the facility) What is your role in ensuring adequacy of laboratory consumables, supervision, reporting, etc.?
19. What are the reporting requirements? Do you receive a target for notification? If yes, what is the target for this facility? Did you reach the target last year?
20. What are the challenges in notifying TB?
21. Do you have any latent TB patients under treatment currently? How many latent TB patients were treated last year?
22. Who supervises your TB-related work? When did you last receive a supervisory visit? enumerate what your supervisor checks when he or she visits you. Did you receive any feedback? Was it useful?
23. Do the TB activities of this facility undergo any review? If yes, how often and who are the participants in the review?
24. Does this facility partner with any community-based groups or other nongovernment organizations for TB control? If yes, please describe the activities.
25. Does this facility work with private providers to control TB? If yes, please describe the activities.
26. Please describe some key problems faced to control TB, and what can be done to overcome these problems.
27. Do you have any questions for me? I am not sure that I will be able to answer all of them, but I will try.

Thank you indeed for your time. We would like to observe the facility now and review some of your registers and database.

Appendix 2C.5: In-depth Interview—Guide for the Private Providers

Name of the Interviewer _____

Date _____

Namaste

Introduce Self

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes. It will also involve an assessment of your facility and review of TB data from your facility.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Location _____

Type of facility: whether for treatment, or treatment + laboratory only
laboratory _____

Name of the interviewee and qualifications _____

Total months in the current facility _____

1. What are your main duties in this clinic? Do you also work in any government facility?
2. What proportion of your time is spent in TB-related activities, such as diagnosis, treatment, counseling, community outreach, follow-up, reporting?
3. On average, how many suspected TB patients do you see in a month?
4. Currently how many TB patients are undergoing treatment here?
5. Were you given any training to carry out TB control activities? If yes when, what training and who conducted this training? Did you receive any training from government functionaries?
6. Was this training useful? What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.
7. Do the patients come to you directly or are referred by your colleagues from other clinics (or a mix of both)?

Now I would like to ask you some technical questions.

8. When do you suspect TB in a patient?
9. What is done when you suspect TB in a patient? How do you investigate them?
10. Could you tell us the criteria by which TB patients are classified into various categories?
11. What are the facilities available in this clinic to diagnose suspected TB patients?
If none, where do you refer them for investigations?

12. When you attend to a suspected patient and after you initiate treatment, what information do you generally give to your patient?
13. What special care is taken when a patient has other co-morbidities?
Do you refer TB patients for HIV testing?
14. What IEC material is available with you? Are they useful? Do you want to suggest some modifications to the material available?
15. What drugs do you prescribe? (List and note if different for different categories)
16. What are the common side effects of the drugs used for treatment?
17. Do you dispense the drugs or just prescribe them?
18. Where do the patients buy these drugs from?
19. (If provider mentions referral to government facility for free drugs) Which facility provides free drugs and how do you follow up on a patient?
20. How often do you ask the patient to visit you? What happens when the patient does not come for his next follow-up visit?
21. Do you follow a system of appointing treatment supporters for your patients?
22. (If there are labs in the facility) What are the measures taken to ensure quality in the laboratory? Is external and/or internal quality monitoring done?
23. Are you required to submit any reports? If yes, what reports do you submit and to whom?
24. Have you been approached by any functionary from the government seeking you to notify cases? If yes, how many cases have you notified? Do you also report when the patient completes treatment? Do you receive an incentive for this reporting? Are these incentives timely?
25. (If not associated with Nikshay Poshan Yojana reporting) Are you interested in associating yourself with TB notification?
26. Do you receive any support from government functionaries to retrieve patients lost to follow up?
27. Have you been invited to any meetings by the government facility of the City TB program office to review the TB situation? If yes, who were the participants at this meeting? How regular are these meetings?
28. Do you work with any NGOs in the area for TB control?
29. Please describe some key problems faced to control TB, and tell us what can be done to overcome these problems.

Thank you indeed for your time.

Appendix 2C.6: In-depth Interview—Guide for Program Officers

Name of the Interviewer _____

Date _____

Namaste

Introduce Self

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes. It will also involve an assessment of your facility and review of TB data from your facility.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

1. Please describe your role as a City Urban Program Officer or TB officer. How many facilities do you monitor and support?
2. What proportion of your time is spent on each of the TB control activities (for the National Urban Health Mission Officer)
3. What are the current challenges, pertaining to TB, in your district? Are they increasing or decreasing?
4. Please describe some of the difficulties you face in implementing the program and possible solutions.
5. What orientations and training have you received and who conducted this training?
6. What further support did you receive? Please describe the additional support that would have helped you to perform your duties better.
7. What are the facilities available in the city to diagnose suspected TB patients?
8. What additional support is required in the district to diagnose patients?
9. What IEC material is available in the district? Are they useful? Do you want to suggest some modifications to the material available?
10. What is the current strategy for active case finding and management of latent TB?
11. Please describe the role of the following:
 - Urban primary health center (UPHC)
 - TU
 - Private providers and/or hospitals
 - Nongovernment organizations in TB control in your city
12. You are perhaps aware that all UPHCs under NUHM must now be converted into DMCs. What proportions of the UPHCs have been so converted? What are the challenges in operationalizing UPHCs as a DMC?

13. Does the city have a formal partnership with private provider to control TB? If yes, describe the partnership? What are some the challenges that you face in partnering with the private providers? What actions are you taking to surmount the challenges?
14. What are some of the challenges in reporting TB data? What support do you need to improve the quality and timeliness of reporting?
15. Do the activities at the city level undergo any review? If yes how often and who are the participants in the review?
16. Do you have any suggestions for meeting the 2025 goal of TB elimination?

Thank you indeed for your time.

Appendix 2C.7: In-depth Interview—Guide for Stakeholders (National AIDS Control Organization, Municipal, Nongovernment Organizations, Developmental Agency Officers)

Name of the Interviewer _____
Date _____

Namaste

Introduce Self

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable population. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes. It will also involve an assessment of your facility and review of TB data from your facility.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Name _____
Organizational Affiliation _____
Months in current position _____

1. What are the key TB control challenges this city faces?
2. What according to you is one of the successful strategies of the Revised National TB Control Program (RNTCP)?
3. What are the agencies working in the field of TB control in this district? What has been their contribution to the program?
4. How does the National Urban Health Mission (NUHM) contribute to TB control?
5. What are the strategies for managing TB–HIV co-infection? What are the challenges in managing this effectively?
6. How do you receive information about the TB control activities?
7. What in your opinion are the strengths of the urban TB control efforts in the city? What are the weaknesses?
8. How do you coordinate with the RNTCP, NUHM, and other agencies involved in TB control? Probe for institutional mechanisms
9. How does your organization contribute to TB control?
10. What are current strategies to involve private providers or facilities in TB control? What are the challenges and how can they be surmounted?
11. How is TB among migrants being addressed? What are the platforms available in the city to reach the migrant populations? Is there an effort to map the migrants in the city? If yes, have these maps been shared with the health department or accessed by the health department?

12. Please describe workplace interventions in the city that you are aware of. Describe any workplace interventions or interventions for migrant population that your organization is implementing.
13. What are the other agencies supporting your efforts in controlling TB?
14. Would you like to add anything further that may help us design improved strategies in the future? Please add any other comment that we may not have covered during the interview.

Thank you indeed for your time.

Appendix 2C.8: In-depth Interview—Guide for Workplace Health Officer/Supervisor

Name of the Interviewer _____

Date _____

Namaste**Introduce Self**

Preamble: We are from the Asian Development Bank and have been working with urban health providers to strengthen access to services, especially for vulnerable populations. I am here to understand the TB services available to your communities and would like to understand your perspective on the strengths and weaknesses of the program. This will enable us to make improvements in the program strategies and identify issues requiring resolution. This will be a confidential discussion and your name will not be attached to your quotes. It will also involve an assessment of your facility and review of TB data from your facility.

We anticipate the discussion to take about 1 hour. Do we have your permission to proceed? (Name of Observer or Reporter) will be writing down some of the things that we will be talking about so we can remember later. Does anyone object?

We are the only ones who will know your names. We will not use any names in our reports. If we have your consent, we would like to record the conversation on this recorder. This will help us remember the conversation and will remain confidential. If you consent, please sign this consent form.

(If response is yes, continue with the following questions)

Name: _____

Organizational Affiliation: _____

Months in current position: _____

1. What proportion of your workers are migrants?
2. What are the source and transit sites of these migrants?
3. What are the health facilities that your organization makes available to the workforce?
4. Is TB prevention and control one of the services provided? If no, why not?
5. What training has the medical officer and other staff received in preventing and controlling TB?
6. What are the diagnostic facilities available at the facility? If not, where are patients referred for TB diagnosis?
7. Which is the closest public facility to your workplace? Are you aware of any urban primary health center, DMC, or TU nearby?
8. Do you provide TB treatment at the facility? If yes, where do you procure the medicines from? What medicines are prescribed for TB?
9. Has your organization conducted any awareness generation activities for TB among your workforce? If yes when and how often?
10. Have you been approached by the representatives of the government facilities to seek your participation in TB control? If yes, who contacted you? (Probe for Revised National TB Control Program, National AIDS Control Program, and NUHM representatives)
11. Do you have partnership with any other agencies to control TB or HIV? If so, please describe the activities under this partnership.
12. Have you made any IEC material available to the workforce?
13. What are the challenges you face in informing the workforce and managing TB?
14. What additional support do you need to ensure TB prevention and management?
15. Kindly provide us your suggestions to improve the health condition of the migrant workers?

Appendix 2D.1: Health Facility Checklist

Name of the Facility: _____

Type of facility: treatment-only, microscopy laboratory,
treatment and microscopy _____

Name of the Observer: _____

Date of Visit: _____

General Information

Separate area where all suspected TB patients report	Y	N
IEC material displayed in the facility	Y	N
Provision for safe sputum disposal	Y	N
Area adequately ventilated	Y	N
Dedicated staff to attend TB patients	Y	N
Proportion of facility staff trained in TB	(%)	Trained
Whether TB register present and up to date	Y	N
Whether adequate TB formats available and filled appropriately	Y	N
Whether adequate drugs available (adequacy as a measure of expected number of new patients registered on a quarterly basis)	Y	N
TB suspects examined for diagnosis (for the last quarter)	(#)	
TB suspects found to be positive (for the last quarter)	(#)	
TB suspects undergoing repeat sputum examination (for the last quarter)	(#)	
TB suspects found to be positive on repeat sputum examination (for the last quarter)	(#)	
Patients referred for DST (for the last quarter)	(#)	
TB Patients with HIV	(#)	
Patients with co-morbidities	(#)	
Follow up patients examined (for the last quarter)	(#)	
Patients positive on follow up (for the last quarter)	(#)	
Number of patients registered (for the last quarter)	(#)	
Number of defaulters (for the last quarter)	(#)	
Number with treatment supporters (for the last quarter)	(#)	

Diagnostic Activities

Proportion of TB suspects for whom 2 sputum smears were done for diagnosis? (Can be estimated by examining a few pages of entries in the Laboratory register)	(#)	Done	%
Proportion of patients referred for x-ray	(#)	Done	%
Proportion of patients referred for cartridge-based nucleic acid amplification test	(#)	Done	%

Laboratory Infrastructure and Activities

Is there a separate laboratory space	Yes/No
Is there a standard operating procedure present	Yes/No
Laboratory register present	Yes/No
Is there a functional binocular microscope in the medical center	Yes/No
Is a trained Laboratory Technician doing the sputum microscopy? (When last trained)	Yes/No
Are there adequate supplies of reagents, slides, and other consumables for the next 1 month	Yes/No
Are the names and addresses in the TB laboratory register written legibly	Yes/No
Is there a summary of the microscopy activities at the end of each month	Yes/No
Is the Laboratory Technician preserving slides for review by the supervisor as per the quality assurance protocol	Yes/No
Last supervisory visit and from whom	
Is the supervisor reviewing slides preserved by the Laboratory Technician during the on-site evaluation	Yes/No
Are the reports of on-site evaluation done by supervisor available in the facility (at least for last month)	Yes/No
Is corrective action as suggested in report being carried out by the facility (current status may be used as an assessment about the corrective actions taken)	Yes/No
Is the biomedical waste disposed of as per norms	Yes/No
Does the laboratory engage in mycobacterial culture and drug susceptibility testing	Yes/ No
Total slides examined	
Total slides positive	
Total negative slides	

Treatment Activities

Are patient-wise drug boxes being marked and maintained for each outpatient receiving treatment at the facility
Are the facilities (clean water, disposable cups, privacy) satisfactory
Is there adequate arrangement available for providing Inj SM
Is there consistency between the number of doses on treatment card and drug box (check any 2 boxes)
Box 1 (name_____) Box 2 (name_____)
Are prompt home visits made to bring irregular patients back on treatment (For patients who have missed doses, the relevant section on treatment card can be checked for entries)
Have any of the drugs in the patient-wise boxes crossed the date of expiry
Box 1 (name_____) Box 2 (name_____)
Is home address verification done for patients before start of treatment (Treatment cards can be examined for entries in the section for Initial home visit)

Human Resources

Kind of Staff	Formally Trained in Revised National TB Control Program	Sensitized in Revised National TB Control Program
1.		
2.		
3.		
4.		

Referral for Treatment and Feedback Mechanism

•	Is a referral for treatment register maintained
•	Are treatment forms used to refer patients diagnosed in the facility to other centers, and are they within or outside the district

TB/HIV Coordination

•	Is there an integrated counseling and testing center or antiretroviral therapy (ICTC/ART) in the facility or nearby
•	Is the standard cross-referral mechanism between the facility and ICTC/ART established
•	Is there a mechanism to put TB patients treated in the ART center on TB treatment

Supervision and Monitoring

•	When was the last supervisory visit made
•	Who made this visit
•	What feedback was provided during that visit
•	What follow up action was taken based on the feedback

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Tuberculosis Control Measures in Urban India

Strengthening Delivery of Comprehensive Primary Health Services

Approximately 2.69 million tuberculosis (TB) cases—about a quarter of the global cases—were reported in India on The Global Tuberculosis Report 2019. There are nearly half a million “missing” cases every year, either undiagnosed, unaccountable, or inadequately diagnosed and treated. This paper analyzes the magnitude of TB transmission and the quality of interventions in urban areas and migrant populations in India. It identifies key factors and areas that need to be further strengthened for the country to achieve its goal of eliminating TB by 2025. The study is aligned with the government’s objective to strengthen the provision of comprehensive primary health care services for the urban poor as part of India’s National Strategic Plan, 2017–2025.

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