National TB Control Programme
Directorate General of Health Services
Ministry of Health and Family Welfare

Government of the People's Republic of Bangladesh

National Strategic Plan for TB Control 2021-2025

REVISION 6.0; 31 March 2020

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Abbreviations

ACF	Active Case Finding
ACSM	Advocacy, Communication and Social Mobilization
ADR	Adverse Drug Reactions
aDSM	active Drug Safety Monitoring
AFB	Acid-Fast Bacillus
AHI	Assistant Health Inspectors
AIDS	Acquired Immuno- Deficiency Syndrome
ART	Antiretroviral Therapy
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BDR	Bangladesh Rifles
BGB	Bangladesh Border Guard
BGMEA	Bangladesh Garments Manufacturers and Exporters Association
BITID	Bangladesh Institute of Tropical and Infectious Diseases
BMA	Bangladesh Medical Association
BMDC	Bangladesh Medical and Dental Council
BMMS	Bangladesh Maternal Mortality Survey
BMRC	Bangladesh Medical Research Council
BMU	Basic Management Unit
BNMC	Bangladesh Nursing and Midwifery Council
BPaL	bedaquiline + pretomanid + high-dose linezolid
BRAC	Building Resources Across Communities
BSL	Bio-safety Lab
BSMMU	Bangabandhu Sheikh Mujib Medical University
CAD	Computer aided diagnostics
CC	Community Clinics
CDC	Chest Disease Clinic
CDH	Chest Disease Hospital
CHCP	Community Health Care Providers
CHW	Community Health Worker
CMSD	Central Medical Storage Depot
COE	Center of Excellence
CPC	Cetylpyridinium Chloride
CRG	Community, Rights and Gender
CS	Civil Surgeon
CSR	Corporate Social Responsibility
CT	Contact Tracing
CTB	Challenge TB
CWH	Central Warehouse
DIC	Drop-in Centers
DGHED	Directorate General of Health Engineering Department
DF	Damien Foundation
DGDA	Directorate General of Drug Administration
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DHIS	District Health Information System
DHS	Demographic and Health Survey
DM	Diabetes mellitus
DNS	Directorate of Nursing Services
DOTS	Directly Observed Treatment Short Course (The internationally recommended strategy for TB control until 2005, and the foundation the new Stop TB Strategy introduced in 2006)
DRS	Drug Resistance Survey
DST	Drug Susceptibility Testing
EB	(WHO) Executive Board
EDCL	Essential Drugs Company Limited
EPI	Expanded Programme on Immunization
EPTB	Extra Pulmonary Tuberculosis
EPZ	Export Processing Zone
EQA	External Quality Assessment
ESD	Essential Service Delivery
ESP	Essential Service Package
e-TB	Electronic TB data management system
FAST	Find (TB cases) Actively, Separation (of infectious TB cases and Treatment (with appropriate drugs)
FDC	Fixed Drug Combinations
FIND	Foundation for Innovative Diagnostics
FLD	First Line Drugs
FM	Fluorescence Microscopy
FNAC	Fine Needle Aspiration Cytology
FP	Family Planning
FSW	Female Sex Workers

FYP	Five Year Plan
GDP	Gross Domestic Product
GDF	Global Drug Facility
GOB	Government of Bangladesh
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HA	Health Assistants
HCW	Health care workers
HCW	Health care worker
HRH	Human Resource for Health
HRM	Human Resource Management
DGHEU	Directorate General of Health Economics Unit
HIES	Household Income and Expenditure Survey
HIV	Human Immuno-deficiency Virus
HMIS	Health Management Information System
HPNSDP	Health, Population and Nutrition Sector Development Programme
HPSP	Health and Population Sector Programme
HRD	Human Resource Development
HRH	Human Resources for Health
IC	Infection Control
icddr, b	International Centre for Diarrheal Disease Research, Bangladesh
IDF	International Diabetes Federation
IDU	Injecting Drug Users
IDH	Infectious Disease Hospital
IHT	Institute of Health Technology
IMCH	Integrated Management of Childhood Illnesses
IPT	Isoniazid Preventive Therapy
IPRSP	Interim Poverty Reduction Strategy Paper
IRD	Interactive Research and Development
JMM	Joint Monitoring Mission
KAP	Key Affected Populations
KAP	Knowledge, Attitude and Practice
KPI	Key Performance Indicators
LAMB	Lutheran Aid to Medicine in Bangladesh
LED-FM	Light Emitting Diode Fluorescence Microscopy
LLA	Local Level Advocacy
LLP	Local Level Planning
LMIS	Logistics Management Information System
LPA	Line Probe Assay
LTBI	Latent tuberculosis infection
LTCA	Leprosy and Tuberculosis Control Assistant
NGO	Non-Governmental Organization
MARPS	Most at Risk Populations
MBDC	Mycobacterial Disease Control
MC	Microscopy Centre
MCH	Maternal and Child Health
MDG	Millennium Development Goal
M&E	Monitoring and Evaluation
MDR-TB	Multi-Drug Resistant TB
MNCH	Maternal, Neonatal and Child Health
MO	Medical Officer
MOHFW	Ministry of Health and Family Welfare
MOLGRD	Ministry of Local Government, Rural Development and Co-operatives
MoU	Memorandum of Understanding
MSH	Management Sciences for Health
MSM	Men who have sex with men
MTB/RIF	Mycobacterium tuberculosis /resistance to rifampicin
MAF	Multisectoral Accountability Framework
MBDC	Mycobacterial Diseases control
NACP	National AIDS Control Program
NEMEW	National Electro-medical and Engineering Workshop
NIDCH	National Institute of Diseases of the Chest and Hospital
NIPORT	National Institute of Population Research and Training
NIPSOM	National Institute of Preventive and Social Medicine
NRL	National Reference Laboratory
NSP	National Strategic Plan
NTP	National TB Control Program
NTRL	National TB Reference Laboratory
OPD	Outpatient Department
OR	Operational Research
PLHIV	People living with HIV
PDS	Public Distribution System
PMDT	Programmatic Management of Drug-Resistant TB
PO	Programme Organizer
PPM	Public-Private Mix
PPP	Public Private Partnership

PR	Principal Recipient	SVRS	Sample Vital Registration System
PSM	Procurement and Supply Management	SWAP	Sector Wide Approaches
PWID	People who inject drugs	TEMO	Transport and Equipment Maintenance Organization
QC	Quality Control	TLCA	TB and Leprosy Control Assistant
RCHCIB	Revitalization of Community based Health Care Project	TPT	Treatment for Preventive Therapy
ROI	Return on Investment	TT	Tetanus Toxoid
R&R	Recording and Reporting	TB	Tuberculosis
RR-TB	Rifampicin-resistant TB	UH&FPO	Upazila Health and Family Planning Officer
RSSH	Resilient and Sustainable Systems for Health	UHC	Upazila Health Complex
SCC	Sputum Collection Centre	UN	United Nations
SDG	Sustainable Development Goal(s)	UNHLM	UN high-level meeting
SEM	Social Enterprise Model	UPS	Un-interrupted Power Supply
SK	Shasthya Kormi	VARD	Voluntary Association for Rural development
SLD	Second Line Drugs	VCT	Voluntary Counseling and Testing
SMF	State Medical Faculty	VGD	Vulnerable Group Development
SMS	Short Message Service	WB	World Bank
SPR	Surface Plasmon Resonance (device)	WHA	World Health Assembly
SRL	Supranational Reference Laboratory	WHO	World Health Organization
SOP	Standard Operating Procedure	WIMS	Warehouse Inventory Management System
SS	Shastyo Shabikas (Lady Health Workers)	ZN	Ziehl-Neelsen Microscopy

1 INTRODUCTION

The National Tuberculosis Control Program (NTP) was first launched by the then Pakistan government (now Bangladesh) in 1965 with a vision to eliminate Tuberculosis as a public health problem in Bangladesh. Under the Mycobacterial Diseases control (MBDC) Directorate of the Directorate General of Health Services (DGHS), the National Tuberculosis Control Program (NTP) adopted the Directly Observed Treatment, Short-Course (DOTS) strategy during the Fourth Population and Health Plan (1992-98) under the project "Further Development of TB and Leprosy Control Services". The NTP started its field implementation in November 1993 in four upazilas and progressively expanded to cover all upazilas by June 1998. In July 1998, the NTP was integrated within the component of the Essential Services Package under primary health care of the Health and Population Sector Program (HPSP). The Ministry of Health and Family Welfare (MOHFW) is implementing the 4th Health, Population and Nutrition Sector Program (4th HPNSP) for a period of five and a-half-of-years from January 2017 to June 2022. In all the sector programs tuberculosis control has been recognized as one of the priority programs.

The Government of Bangladesh, together with its many and diverse partners from the public and private sectors, is committed to further intensifying TB control activities in order to sustain the achieved success and to reach the TB control targets linked to the WHO End TB Strategy.

The previous NTP National Strategic Plan (NSP) covered the period 2016-2020. The plan contained strategies and interventions based on the principles outlined in WHO's End TB Strategy[1]. Building on the Strategy's Three Pillars (I. INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION; II. BOLD POLICIES AND SUPPORTIVE SYSTEMS; III. INTENSIFIED RESEARCH AND INNOVATION) and following the key principles of government stewardship and accountability, strong coalition with civil society organizations and communities, protection and promotion of human rights, ethics and equity, and adaptation of the strategy and targets at country level, the NSP 2021-2025 described the key interventions and activities that would enable the NTP to achieve the End TB Strategy's Milestones for 2025 (75% reduction in tuberculosis deaths and 50% reduction in tuberculosis incidence rate) and targets for 2035 (95% reduction in tuberculosis deaths and 90% reduction in tuberculosis incidence rate).

1.1 POPULATION AND DEMOGRAPHY

In 2011, the Bangladesh Bureau of Statistics (BBS) conducted the national population census and according to the census, the total population of Bangladesh was 149,772,364 on 15 March 2011. With an annual population growth rate of 1.37%[2], the SVRS 2018 estimated the population to be 164.6 million. Bangladesh is now going through a demographic transition and the proportion of the population in the adult labour force (15–59 years age-group) has increased resulting in a reduction of the dependency ratio. The steady economic growth

[1] The End TB Strategy; Global strategy and targets for tuberculosis prevention, care and control after 2015; WHO, Geneva, 2015

[2] Report on Bangladesh Sample Vital Statistics 2018, Bangladesh Bureau of Statistics

amid global recession and sporadic natural calamities in the country indicate that the people of Bangladesh are efficiently taking advantages of the demographic dividend. The average household size is 4.2 (persons per family) and 85.8 % of families are male- headed while 14.2% of families are female-headed

1.2 BASIC POPULATION- AND HEALTH STATISTICS

1.2.1 DEMOGRAPHY

Population: 164.6m million (SVRS 2018)

Population density (per sq. km): 1,116 (SVRS 2018); 1,222 inland area (WB 2014)

Population growth rate: 1.37% (SVRS 2018)

Sex ratio (M/F): 100.2/100.0 (SVRS 2018)

Adolescent birth rate (per 1,000 girls): 74 (SVRS 2018)

1.2.2 Health Status

Stillbirth rate (per 1,000 total births): 36 (UN 2015)

Under-5 mortality rate (per 1,000 live births): 45 (BDHS 2017); 38 (UN 2015)

Infant mortality rate (per 1,000 live births): 38 (BDHS 2017); 31 (UN 2015)

Neonatal mortality rate (per 1,000 live births): 30 (BDHS 2017); 23 (UN 2015)

Maternal mortality ratio (per 100,000 live births): 196 (BMMS 2016); 173 (WHO 2017)

Life-expectancy at birth (years): Both sexes: 72.3; Male: 70.8; Female: 73.8 (SVRS 2018);

1.3 MANAGEMENT STRUCTURE AND TYPE OF HEALTH FACILITIES UNDER THE DGHS/MOHFW

The healthcare infrastructure under the DGHS comprises six tiers: national, divisional, district, upazila (sub-district), union, and ward. At the national level, there are institutions both for public health functions as well as for postgraduate medical education/training and specialized treatment to patients. A divisional director for health in each division governs activities and is assisted by deputy directors and assistant directors. The civil surgeon (CS) is the district health manager responsible for delivering secondary and primary-care services. In each district, there is a district hospital. Some district hospitals have superintendents to look after the hospital management. The upazila health & family planning officer (UH&FPO) is the health manager at the upazila level. At the union level, three kinds of health facilities exist: rural health centers, union subcenters, and union health & family welfare centers (UHFWCs). At the ward level, the Ministry has thus far recruited full-time community healthcare providers to run 13,750 community clinics and 14,890 clinics are planned to be functional by 2025. In addition, NGOs and other private providers in both the formal and informal sectors play a significant role in health care provision and are frequently the patients' first contact point.

2 LESSONS LEARNT FROM THE NATIONAL TUBERCULOSIS STRATEGIC PLAN 2016-2020

The Government of Bangladesh is committed to intensify the TB control activity in order to sustain the achieved successes and to reach the TB control targets linked to the Sustainable Development Goals (SDGs) and WHO END TB strategy. TB diagnosis and treatment in Bangladesh is completely free of cost to all the citizens of the country and will remain free.

Yearly, over 2 million people with symptoms of TB are tested and approximately 1 million lives have been saved in the last decade. Bangladesh is steadily progressing towards universal health coverage. In 2018, 75% of the estimated TB cases were detected and put on treatment, while in 2001 only 26% of TB cases were put on treatment. Since 2001, there has been a 50% reduction in TB mortality. Bangladesh is maintaining a sustained treatment success rate over 90% since 2005 and a 93.6% treatment success rate as of 2018.

Of major importance for the development of the current NSP are the following lessons learnt from previous NSP implementation:

- **Coherent strategic vision, strong coordination, and well-structured programme implementation**
    - Clear strategic plans to guide NTP work
    - Alignment of strategic plans with overall 4th health sector strategy
    - Clear organisational structure of the national programme
    - Well-coordinated program activities

- **Strong political commitment to Universal Health Coverage (UHC)**
    - UHC implementation is facilitated by expansive health service delivery network
    - Increasing availability of TB services closer to the patients

- **The NTP was able to directly translate a funding increase into a substantially increased case detection level**

The key concern about the TB situation in Bangladesh during recent years has been a relatively low case detection level, despite adequate program performance in terms of treatment success for detected cases. The increase of case detection was the key issue highlighted in the previous NSPs. NTP put strong focus of effort on improving case detection and linkage to care to interrupt chain of transmission and introduced technologies that provide early, rapid case detection.

The experience during NSP implementation has shown that the NTP is able to directly translate an increase of funding into increased case detection rates and reaching the unreached (*i.e. hard to reach areas like Char, hill tract areas, tea garden including screening with X-ray targeting high risk settings such as prisons, slums, areas with high migratory populations, and other high risk groups (miners and other workers intensely exposed to dust, workplace- areas with high concentrations of informal sector workers*) to increase case notifications.

During the Global Fund's grant implementation period, the case notification rate for all forms of TB increased from 122/100,000 in 2014 to 162/100,000 in 2018. Mentionable, NTP's cash reimbursement program for EP-TB and smear negative to poor and remote patients enhanced case detection.

- **Social support policies for Multi-Drug Resistant (MDR)−TB patients and incentive package for MDR−TB DOT Providers across all sites in the country**

Social support mechanisms for MDR-TB patients, as well as financial incentives for MDR-TB DOT providers have been very effective in ensuring treatment success. Social support mechanisms for MDR-TB patients in the form of nutritional support, reimbursement of investigation costs and travel allowances during follow up, as well as monthly financial incentives for MDR-TB DOT providers have been very effective in ensuring treatment success. NTP also ensured provision of ancillary medicines is available at TB treatment facilities at no cost to all MDR-TB patients.

- **Community-based case finding activities can be very effective in increasing case detection levels**

Currently, the intensity of community-based case finding activities varies greatly between different divisions and districts in the country. An important observation during several Joint Monitoring Missions (JMM) was that case detection levels are significantly higher in areas with a high intensity of community-based case finding activities, highlighting the importance of this intervention for further increased case finding throughout the country. The strong engagement of community health workers to aid case identification, diagnosis and treatment and disseminate awareness information demonstrated an effective model.

- **Continued high treatment success rate**

In Bangladesh, treatment success is high at above 92% and continues to improve steadily by about a percentage point over the last four years, from 92.8% in 2014 to 93.6% in 2017.

- **Public Private Mix (PPM) activities have been successful in increasing case detection**

As a result of intensified PPM activities which includes Social Enterprise Model (SEM), Community based Shastha sabika Model, Village doctors' model etc. during recent years, there is now widespread acceptance of private providers as one of the important target groups for outreach and referral of presumptive cases. This is seen in urban clinics that integrated TB services (with high yield and at low cost) and in other delivery models that combined direct referral by community-based volunteers with outreach efforts to private providers. The effect of these interventions has been a continuous increase of the proportion of TB referrals from the private sector to NTP case finding.

- **The higher sensitivity of Gene Xpert compared to smear-microscopy has the potential to significantly increase bacteriologically confirmed case detection levels**

During the recently conducted prevalence survey, all presumptive cases were evaluated with both smear microscopy and Gene Xpert. The results of the survey showed a consistently higher sensitivity of Gene Xpert across all patient groups, highlighting the potential role of

the test to further increase case detection. Mentionable, the rapid expansion of GeneXpert in 224 sites demonstrates a significant increase in case detection.

- **Existing Gene Xpert machines have remained underutilized due to restrictive diagnostic algorithms, improper maintenance and lack of access from peripheral levels**

Access to Gene Xpert machines has remained difficult in remote areas. As a result, several JMMs noted that nearly all existing Gene Xpert machines have been under-utilized. An additional factor leading to under-utilization was the lack of regular maintenance of Xpert machines, which resulted in some machines being out of order for prolonged periods of time.

- **More than 50% of prevalent cases do not meet the current presumptive criteria that would be detected by current diagnostic algorithms**

A key finding of the recent prevalence survey was that more than 50% of prevalent cases do not have any symptoms listed in current diagnostic algorithms, i.e., they were only detected due to the mass X-ray screening used during the prevalence survey. In addition, more than 30% of prevalent cases do not seek any care. These findings have major implications for the future role of active case finding and screening activities.

- **The prevalence survey highlighted gender-specific and geographic risk factors for TB**

The prevalence survey showed a consistently higher prevalence of TB among males of all age groups, elderly as well as a higher prevalence of the disease in urban areas, highlighting the need for specific interventions addressing these risk factors.

- **The prevalence of MDR-TB may be lower than previously assumed**

The NTP had previously estimated a total number of 9,700 MDR-TB cases that could be detected through intensified MDR-TB detection activities. That figure was derived be extrapolating the results of the 2011 Drug Resistance Survey (DRS), which showed 1.4% and 29% MDR in new- and retreatment cases, respectively. The NTP conducted another DRS in 2017, and the preliminary results of that study have to be used to update the projected number of MDR-TB cases on average, the observed MDR level in the preliminary results are 0.9% in new cases, and 1.5% in retreatment cases.

- **Successful implementation of MDR-TB shorter regimen**

During the implementation of the NSP 2016-2020, the NTP successfully implemented the shorter regimen for MDR TB treatment more than 80% of total MDR-TB patients enrolled on Shorter Treatment Regimen (STR) in 2018.

- **TB preventive Therapy**:

With USAID ‘s Support, the NTP conducted a feasibility study conducted with 3HP in Dhaka metropolitan city from October 2018 to March 2019. During the study period, the study team visited households of 883 index patients and counseled all 3,193 household contacts to visit the health facility. A total of 2,149 (67%) contacts visited, and Chest X-ray (CXR) was performed on 1,804 (84%) to rule out active TB. The team identified 39 (2%) contacts with

TB and began anti-TB treatment and then, counselled 1,673 (93%) contacts that were eligible for Preventive Therapy (PT) and began PT on 1,216 (73%) contacts who consented. The mean age of participants was 27, and 56% were female. A total of 1,175 contacts (97%) completed PT with no serious adverse events. The study concluded that the 3HP preventive therapy is feasible in Bangladesh. However, it will require a huge amount of resources to scale it up across the country. This strategy 2021-2025 suggest developing a plan of action and to mobilize more resources to scale up the preventive therapy in Bangladesh.

- **Establishment** of **specialized child TB centres:**

The NTP of Bangladesh established four child TB centres in Bangladesh during the implementation of the NSP 2016-2020 to facilitate the diagnosis of child TB. The number of diagnosing the child TB almost doubled between 2013 and 2018. The NSP 2021-2025 plans to scale up the specialized Child TB centers in Bangladesh.

- **Implementation of electronic Patent Tracker**

During the implementation of the NSP 2016-2020, the NTP scaled up the **e-TB Manager**: After the initial success with e-TB Manager to track individual patients in 382 Upazilas, the system is planned to roll-out nation-wide by December 2020. It will help the NTP to track the patients and to do regular follow-up. The NTP also introduced the mandatory notification system: as part of mandatory notification system, the NTP successfully piloted *Janao* APP through the involvement of the professional associations/private providers/institutes for improved TB notification and the integration of private sector treated TB patients into the national database. It is helping the NTP to track the patient outside of the public facilities who otherwise would have missed from notification. The NTP now plans to expand the Janao APP all over the country.

- **Establishment of a Bio-safety lab**

With the support from USAID, the NTP established a state-of-the-art lab (Bio Safety Lab, label- 3) in Sylhet. The laboratory serves as a center of excellence to provide TB and DR-TB diagnostic services, build staff capacity at the regional level, conduct operational research, and serve as a TB education center. It ensures the highest level of safety for staff, equipment, and the environment. Multipronged efforts by the NTP and donors are needed to mobilize resources and sustain lab operations. Given the implementation experience, the scalability of a prefabricated BSL-3 lab would have low marginal cost to provide TB diagnosis services. The NTP plans to strengthen other regional laboratories for TB diagnosis during the implementation of the NSP 2020-2025.

A SWOT analysis was done and added to the annex-2 of the NSP.

3 TB EPIDEMIOLOGY

This section is based on the Epidemiological review in Bangladesh, August-September 2019, and additional analyses by the NTP team.

The WHO estimated the incidence for all ages and all forms of TB in 2018 in Bangladesh to be 221 (95% CI:161-291) per 100,000. These estimates are based on notification data together with expert opinion regarding under-notification in Bangladesh. These WHO estimates will be updated based on results from a recently completed TB prevalence survey 2015-2016:

Table 1: WHO estimates of TB burden 2018

Estimates of TB Burden 2018	Number (thousands)	Rate (per 100,000 population)
Mortality [1]	47 (30–67)	29 (18–42)
Incidence [2]	357 (260–469)	221 (161–291)
Incidence (MDR/RR-TB)	5.9 (3.2–9.6)	3.7 (2–5.9)

1. Excludes HIV positive TB
2. Includes HIV Positive TB

3.1 TB PREVALENCE

3.1.1 2015 to 2016 Bangladesh Prevalence Survey[3]

The most recent survey of 98,710 participants (90.7% of the 108,834 eligible respondents), was conducted between 2015 and 2016[8], was designed in accordance with WHO standards to assess the prevalence of bacteriologically confirmed TB among those 15 years of age and older. It also sought to estimate the prevalence of smear-positive bacteriologically confirmed pulmonary TB as well as an estimate of the prevalence of symptoms suggestive of TB.

The prevalence figures for bacteriologically confirmed TB and smear positive TB were estimated to be 287 (95%CI: 244-330) and 113 (95% CI: 87-139) per 100,000 adults, respectively. Bacteriologically confirmed TB prevalence was higher in men compared with women, in urban relative to rural settings and increase with age, particularly notable for high prevalence in the older, 65 years and above age group. The higher prevalence in the older population indicates that the TB epidemic is aging – attributable to latent TB infection relative to new infections.

The survey indicates that prevalence is higher among men than women, and in the urban relative to rural setting (Figure 1). However, it is by no means certain that these variables will be independent with age. While the survey was not powered to evaluate the independent effects of sex, urban vs rural and age, a provisional analysis looking at the joint contribution

[3] 2015 to 2016 Bangladesh Prevalence Survey Report

of sex and setting indicates that that urban males have a uniquely high prevalence of TB. Due to limited statistical power, caution should be given when interpreting this. However, given the higher contact rate of men relative to women, and the high concentration of people in the urban setting, it would be reasonable to make investments in reducing under-diagnosis of urban males a priority to help decrease forward TB transmission. Given the elaborate private health care sector in urban settings, the involvement of private health care providers seems important to optimize detection and notification.

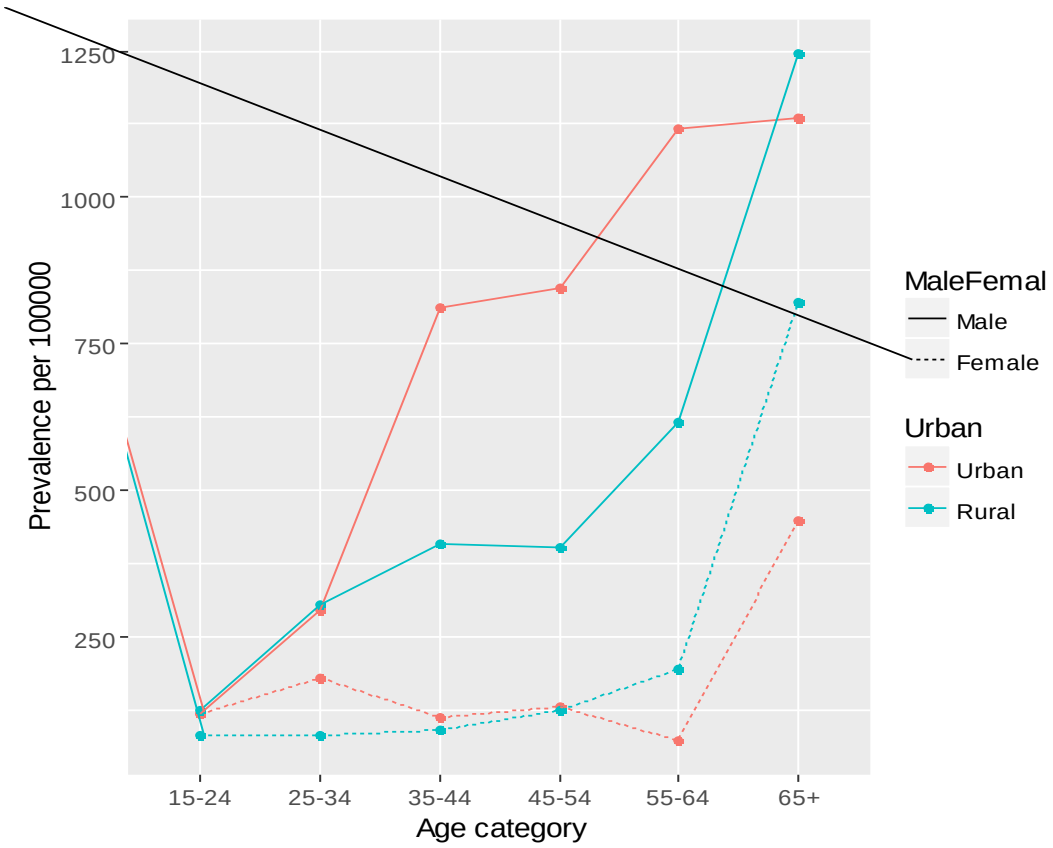


Figure 1 Prevalence by sex and urban (vs rural) categories in 2015-16 Bangladesh prevalence survey

3.2 TB CASE NOTIFICATIONS TRENDS

The number of TB cases notified in Bangladesh has steadily increased since 2004. The rapid increase of bacteriologically confirmed pulmonary TB cases between 2004 and 2006 reflects enhanced case-finding with the establishment and scale-up of the DOTS program that achieved full coverage in all districts of Bangladesh in 2007. Between 2007 and 2014, bacteriologically confirmed pulmonary case notification remained relatively constant with the exception of a notable decline in 2011 that is explained by a gap in GFATM funding. The increase of bacteriological confirmed notifications beginning in 2015 to the most recent year may be attributed to the expansion of GeneXpert diagnostics and referral of samples to the GeneXpert testing hubs.

In 2013 a sharp changed occurred among clinically diagnosed pulmonary cases increase – implied by the increment between the purple (smear negative) and the gold (clinically diagnosed) trends (Figure 2). This corresponds to efforts by NTP and partners beginning in 2013 to invest in the support of chest X-ray, biopsy and other tests whenever needed.

A further reason for the increase in both the new clinically diagnosed pulmonary TB as well as Extra Pulmonary (EP)-TB is that medical colleges have opened DOTS corners, and diagnosis has increased as a result of utilizing specialized doctors in this setting. Additionally, the steady increase in EPTB cases over time likely reflects efforts of the NTP to improve education and diagnostic capacity of EPTB.

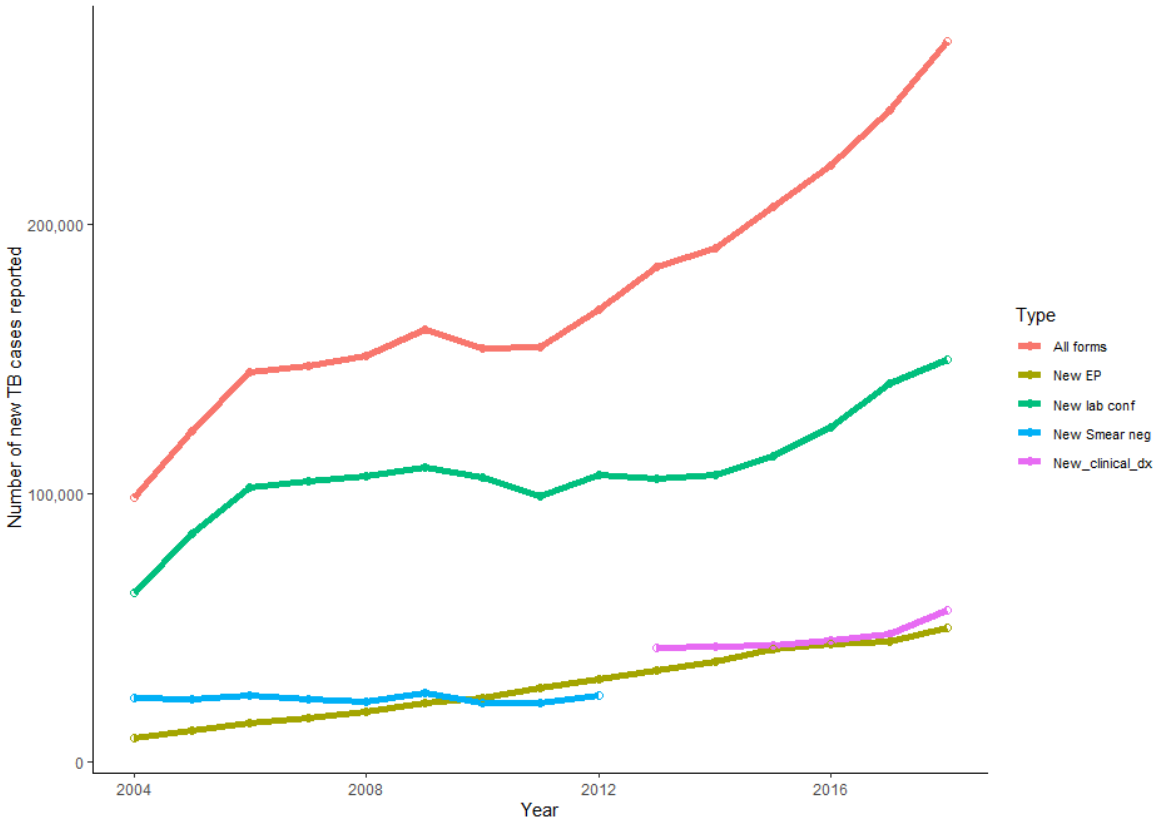


Figure 2 National TB notification by disease category (all TB, new bacteriologically diagnosed-pulmonary, new clinically diagnosed-pulmonary, new extra-pulmonary) in Bangladesh, 2002-2018

The prevalence to case notification ratio in the adult (>15 years) population overall was 2.8 (Figure 3). It is higher in males (3.6) than females (1.9) and highest among those 65 years and above (4.3) and lowest among the 55-65 (1.9) and the very young 15-24 (2.0) year old.

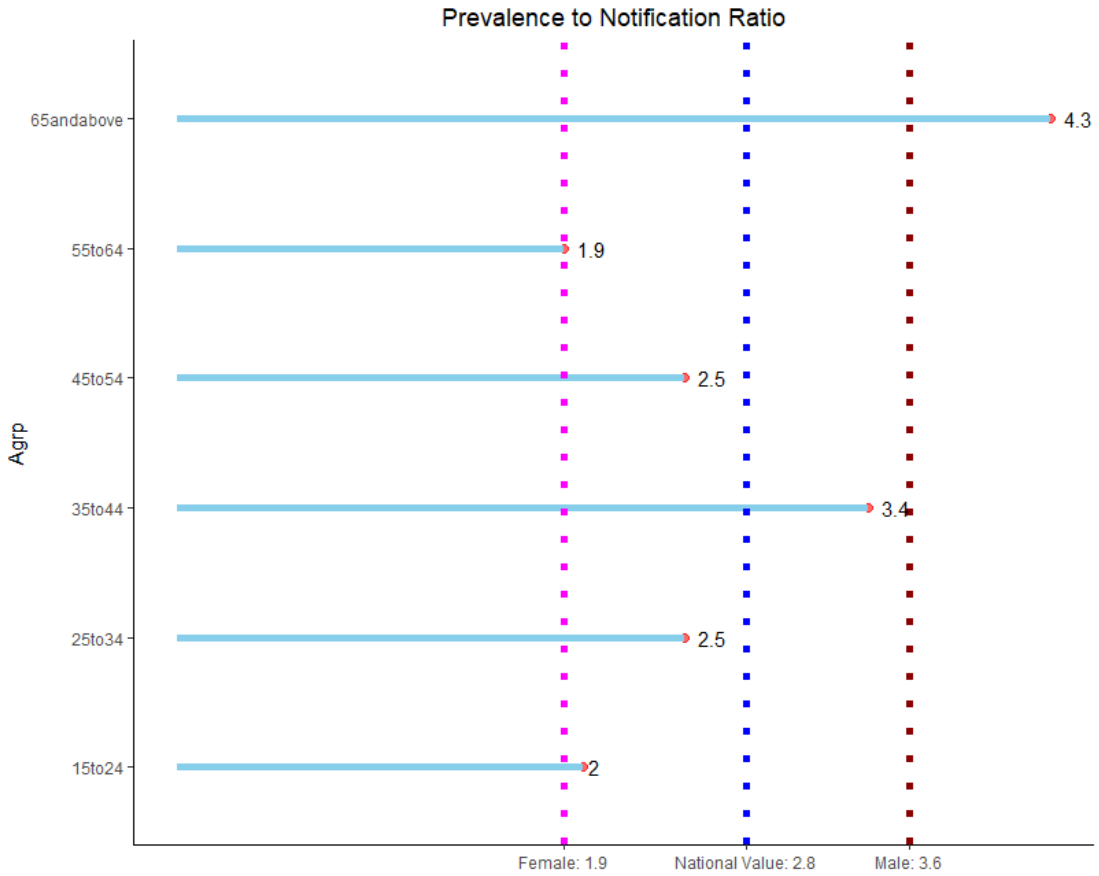


Figure 3 Prevalence to notification ratio in 2015-16 Bangladesh Prevalence Survey

Notification between 2014 and 2018 by age is shown in Figure 4 below. In 2014, notifications were highest among 25 to34 year old. While notifications increased in this age category, the greatest gains over time were achieved among the older age categories, 35 to 44 through those older than 65 years. Notifications among 15 to 24-year old remained flat over time. Increases were also seen in the 5 to 14 years age group. However, these age specific trends may be confounded by other determinants of notification such as gender and site of TB to be considered below.

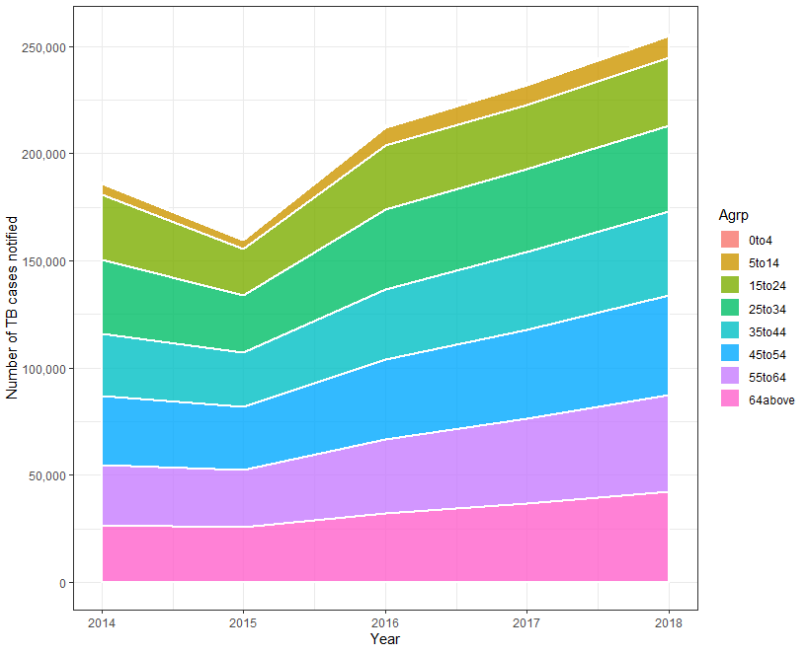


Figure 4 Total TB notifications over time by age category

NEW TB NOTIFICATIONS BY AGE, SEX AND SITE OVER TIME

The above improvements in notifications over recent years, however, may obscure important differences in the age and sex of TB patient. The improvement in notification over time by age is similarly confounded (Figure 5).

As demonstrated in Figure 5 below showing new TB notifications in 2014-2018, the relationship between age and new TB notifications is different by disease site/diagnosis, as well as by sex. Among those with new pulmonary TB, notifications increase with age and are higher among males than females which correlates with the findings of the prevalence survey from 2015-16. TB Prevalence increased monotonically from 103 to 462 per 100,000 among 15-24 and those 65 years and above respectively (Table 2). Prevalence was also higher among males (453 per 100,000) compared to females (143 per 100,000).

	Prevalence per 100,000	Notification per 100,000	P:N ratio
National (15+)	287	102	2.8
Male	452	127	3.6
Female	143	76	1.9
Age groups (years)			
15-24	103	52	2.0
25-34	183	73	2.5
35-44	302	88	3.4
45-54	338	137	2.5
55-64	462	241	1.9
65 yrs and above	954	223	4.3

**Prevalence; bacteriologically confirmed cases from the survey*
Notifications-pulmonary TB (new bacteriologically and clinically diagnosed) from NTP

Table 2 Prevalence, Notification and prevalence to notification ratio by sex and age

source: National Tuberculosis Prevalence Survey, Bangladesh 2015-16).

Notably, new pulmonary TB notifications among females decreases significantly among older women, 55 to 64 and above. This suggests that sex and age prevalence to notification ratios that are reported separately, likely have a joint effect where the deficit in notification is particularly large among older females.

Among new extra-pulmonary TB patients, the relationship with age is more complicated, higher for females and increasing through young adulthood and then decreasing after 34 years of age. However, even here the notification suggests a differential fall off in notification among females.

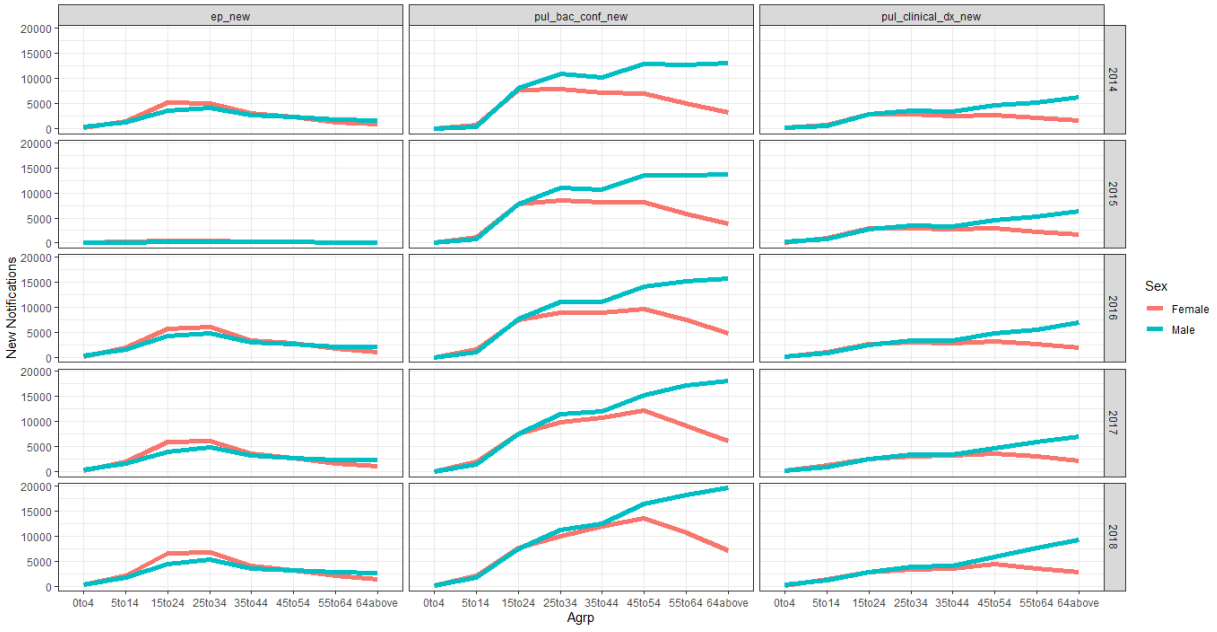


Figure 5 National TB notification by disease category (all TB, new bacteriologically diagnosed-pulmonary, new clinically diagnosed-pulmonary, new extra-pulmonary) in Bangladesh, 2002-2018

3.3 DRUG-RESISTANT TB

The number of DR-TB patients diagnosed in Bangladesh has remained relatively steady since 2014 till 2017. A 26% incremental increase in number of cases in 2018 is attributed to an increase in GeneXpert machine coverage to 17% (185/1,090 microscopy centers) and of rifampicin testing for all presumptive DRTB patients. 83% of presumptive DRTB patients are initiated on shorter treatment (Figure 6). The treatment coverage has remained high of about 95% with a slight drop in 2018.

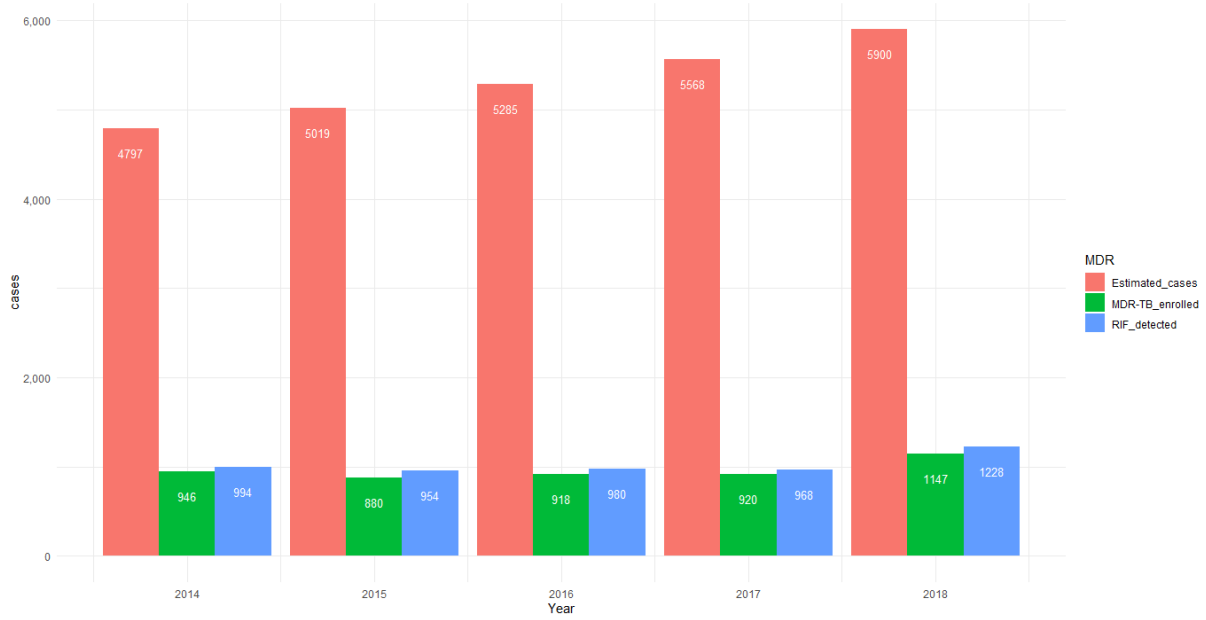


Figure 6 Drug resistance treatment coverage from 2014-2018 in Bangladesh: number diagnosed, initiated treatment and treatment coverage

Of the 5,900 estimated DRTB cases in 2018, the NTP detected 1,228 (21%) This indicates the need for further expansion of drug-resistance testing and surveillance, with inclusion of drug-resistant TB recording and reporting within the national TB surveillance system. The number of DR-TB diagnosed is based on the GeneXpert tests, which may overestimate because of repeated tests from the same patients. Data cleaning for 2018, showed only 1,228 DR-TB patients were diagnosed, and 93.4% of diagnosed patients were put into 2nd line treatment. The findings call for the data quality checks every quarter to ensure the number diagnosed are not overestimated.

3.4 TREATMENT OUTCOMES

High quality TB care is critical to cut transmission rates as well as to prevent death. NTP report on the analysis of TB treatment outcome data for DS-TB notified cases, nationally, by year (Figure 7)

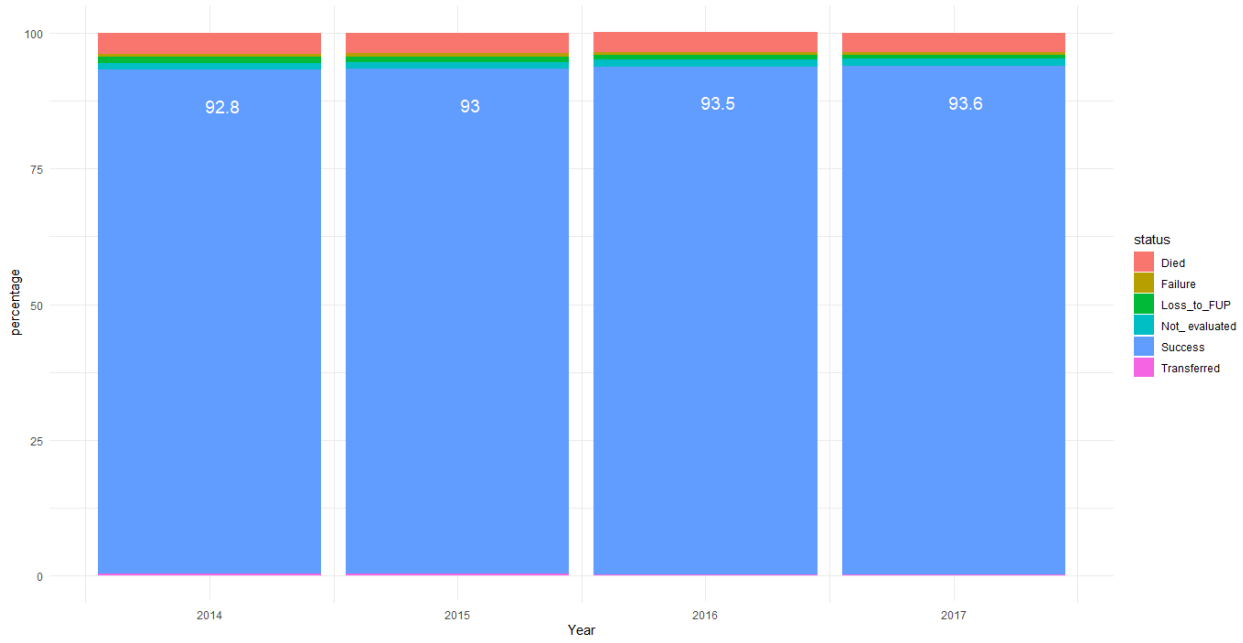


Figure 7 Treatment outcomes (in percentage) over the years 2014- 2017

The most recent year for which outcome data is available is 2017. Treatment success includes those that are either “cured” or “completed”. In Bangladesh, treatment success is high at above 92% and continues to improve steadily by about a percentage point over the last four years, from 92.8% in 2014 to 93.6% in 2017.

3.5 CHILDHOOD TB

Although child TB detection has doubled between 2013 and 2018, almost three quarters of the 36,000 estimated children with TB remained undiagnosed in 2018 (Figure 8). Just over 1,000 cases of under-5 TB (a mere 6% of estimated cases) were diagnosed in a country with 15 million under-fives.

Figure 8 Ratio of childhood TB aged 0-4 years compared to 5-14 years in Bangladesh (National and Divisional level)

If detection continue to increase at this rate, we will not achieve United Nations High Level Meeting (UNHLM) target 2 of 29,800 child TB detections in 2022 (Figure 9).

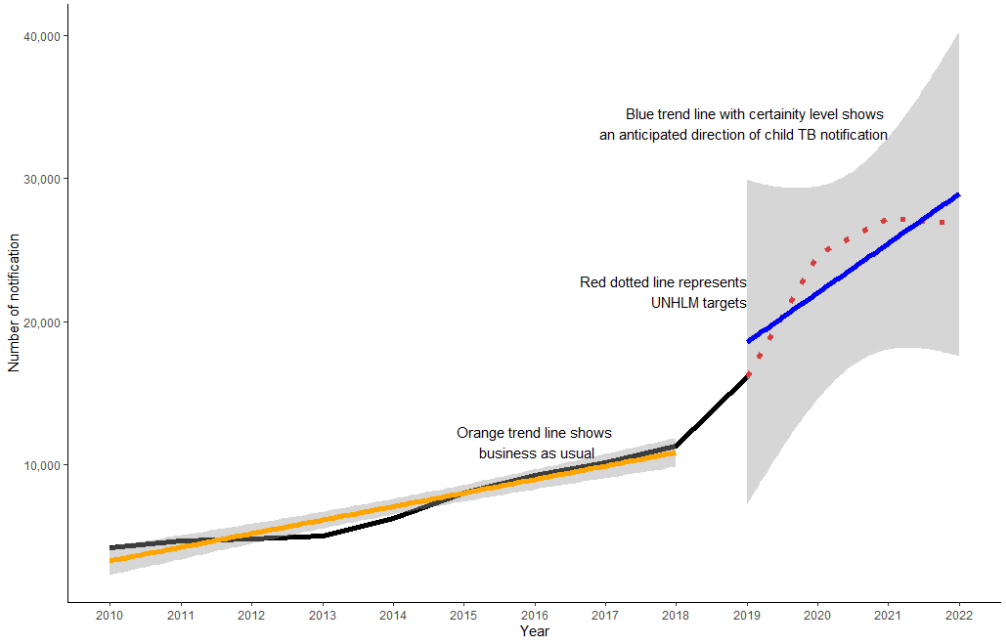


Figure 9 Child TB trends – UNHLM or Business as Usual

The documented increase in child TB case notification is higher in 5-14 years old than in 0-4 years old and so, the ratio of TB case notification among the 0-4 years to 5-14 years has remained low for the past 4 years at less than 0.2 against a WHO recommended ratio of 1.5 – 3. In 2018, among the estimated 36,000 incident cases of child TB, only 11,318 (31%) were notified, which included 1,092 children in the 0-5 years and 10,226 children in the 5-14 years age groups respectively giving a 0-4:5-14 ratio of 0.1. This suggests that TB is grossly under diagnosed and or underreported in the 0-4 years age group and this calls for enhanced TB case finding efforts in this particular age group given the documented evidence of higher

mortality and higher rates of TB complications in this age group. Optimizing case finding in this age group provides an opportunity for the country to get back on track with continuing to reduce under five mortality, whose decline has recently stalled.[4]

3.6 TB MORTALITY

Vital registry data are currently inadequate to evaluate TB mortality in the country. The WHO Global TB program provides estimated TB mortality trends (excluding HIV) over time.

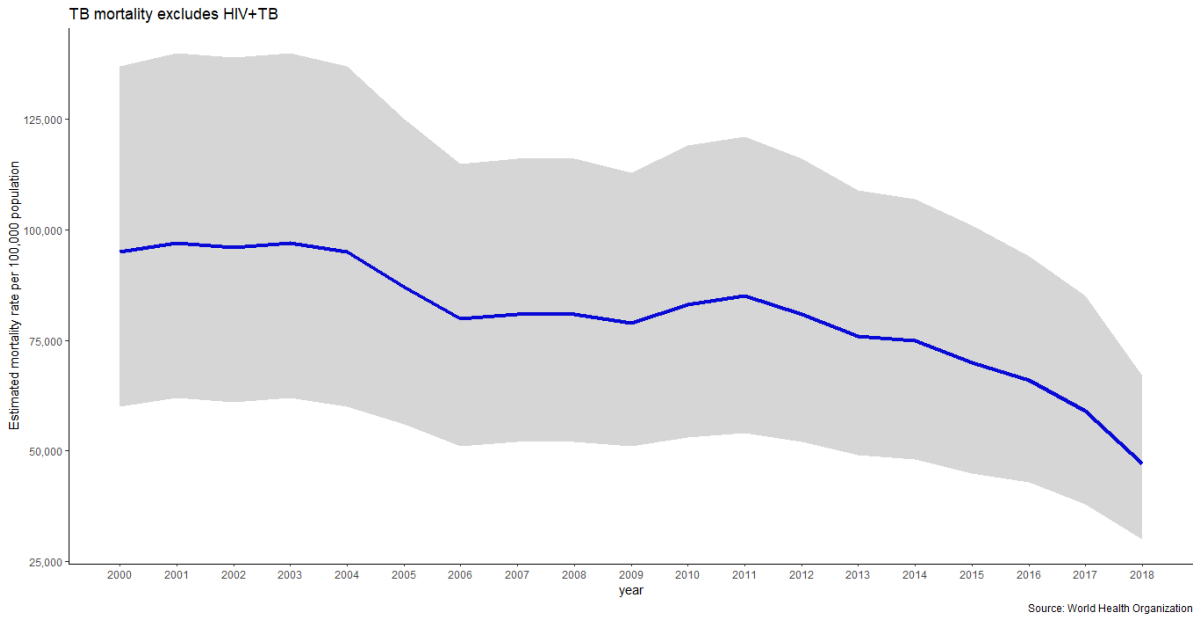


Figure 10 Mortality rate per 100 000 population per year

While current surveillance does not yet provide the ability to measure TB mortality directly, a nationally representative verbal autopsy study conducted by the James P Grant School of Public Health in 2016 noted the following:

- TB is the fifth major cause of death in the country and in the general population approximately 6.8% of the total deaths are TB death
- According to the SVRS 2014, in any random area in Bangladesh 520 people die per 100,000 population. However, according to these study results, 6.8% of those 520 deaths are caused by TB
- Mortality due to TB is higher in urban areas (11.9% TB) relative to rural areas (9.4%).

- Among males 12 out of 100 deaths are caused by TB and among females 6.4 out of 100 deaths are caused by TB.

3.7 DETERMINANTS OF TB

3.7.1 Demographics

Population density is 1142.17 persons per square kilometer which makes Bangladesh the 7th most densely populated country in the world. The density per district is shown in figure 11. The conditions favorable for local transmission of TB include social mixing implicit in community settings with high population density. In the context of poverty, population density implies crowding and poor ventilation that create conditions favorable for transmission.

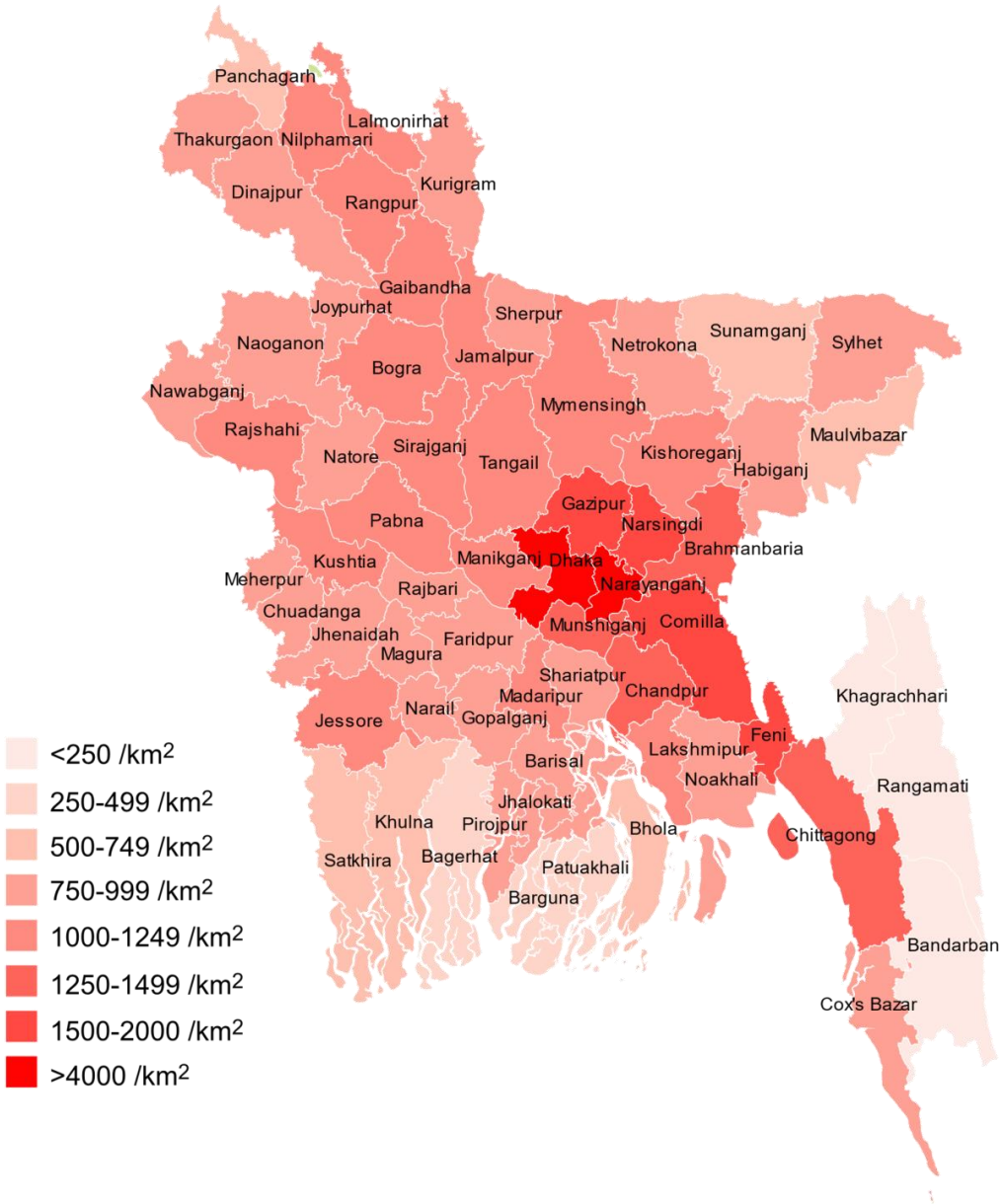


Figure 11 Population density in Bangladesh per district

3.7.2 Socioeconomic status – national

Rapid development in the last several decades has brought with its significant demographic changes with relevance to the epidemiology of TB. Life expectancy has increased, and childhood mortality has decreased resulting in a shift in the age distribution to older ages (**Error! Reference source not found.**3)

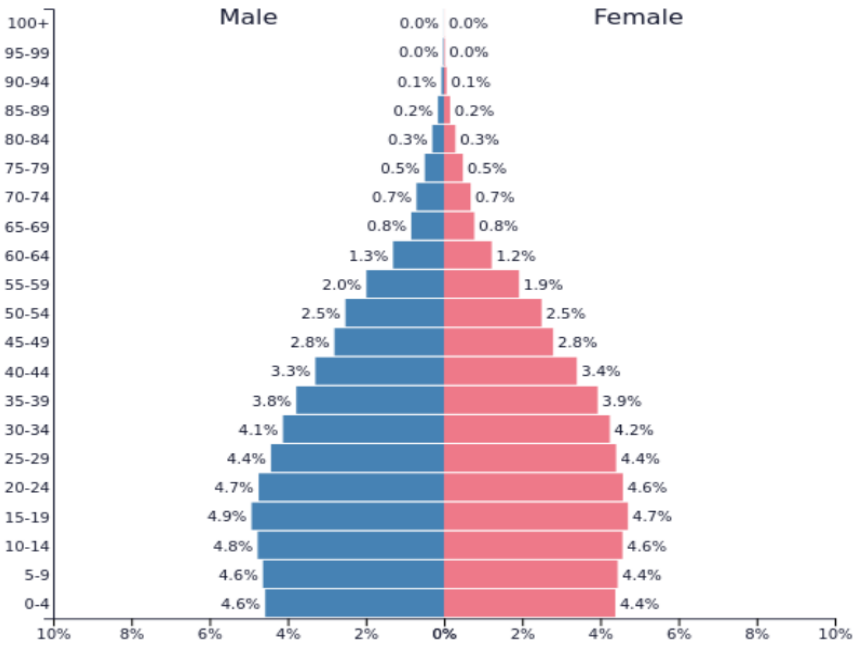


Figure 12 Population Pyramid

(source: *https://www.populationpyramid.net/bangladesh/2019/*)

4 KEY CHALLENGES

To identify key interventions that will most likely contribute to an improved performance of the NTP, a gap analysis was performed describing current gaps in NTP performance for key programmatic areas. The analysis drew on the results of the Joint Monitoring Mission that was completed in September 2019. The mission provided an updated assessment of the status of TB control in Bangladesh, as well as a detailed description of achievements and deficiencies in key programmatic areas. The programmatic areas that were considered for the gap analysis are listed in the table below.

Programmatic areas considered for gap analysis

- TB service delivery
- The TB Laboratory network
- Programmatic Management of Drug resistant TB
- Child and Adolescent TB
- Tuberculosis Preventive Treatment
- Engaging all care providers (PPM)
- The TB Procurement and Supply Chain Management System
- The Tuberculosis Health Management Information System
- Health System Strengthening, Political commitment, Governance and Coordination

While good progress is being made to make health services, including TB services, universally accessible, many constraints remain. These include:

1. Gaps, some of which are serious, in access to early and accurate diagnosis, with a proportion of the population not well served with TB diagnostic services.
2. There is limited attention to cascade of care analysis to understand bottlenecks to access and leakages in the system to enable greater access to TB services and the early identification of most TB cases[5]. Limited and relatively old studies suggest that delays in TB diagnosis and initiation of treatment in Bangladesh are common and can be very long. These delays in TB diagnosis and treatment initiation promote TB transmission and may contribute to the slow decline in TB incidence.
3. While the chest x-ray has been given a prominent place in the TB diagnostic algorithm access remains a challenge with some facilities not having the equipment or having analogue x-ray machines, lack of radiographers , non-use of technological advances in chest radiography such as computer aided diagnostics (CAD4TB) to support chest x-ray interpretation, inadequate use of the potential for remote reading of chest x-rays and the imposition of user fees for the chest x-ray.
4. In some facilities and among certain providers (college hospitals, private providers) a large proportion of patients are clinically diagnosed and there are extra-ordinarily high proportions of extra-pulmonary forms of TB (53% in one health facility). These observations raise concern about the quality of TB diagnosis in these settings.

5 Rifat M et al. IJTLD 2011 May; 15(5): 647-651

5. Opportunities for integrated people-centered care, including linked care for HIV, MCH, Diabetes, and nutrition services and inter program use of joint resources including radiology, Xpert, microscopy have not been fully utilized.
6. While the NTP has identified groups of people that are vulnerable to TB (urban males, the elderly, slum dwellers), there wasn't much evidence of efforts for enhanced or targeted interventions to find TB cases in these populations. Efforts to enhance TB case finding in incarcerated populations have yet to achieve full coverage of this population.
7. Medical college hospitals have not adopted approaches such as Finding, Actively, Separating, and Treating (FAST) to rapidly identify TB cases. The risk of TB transmission in these settings is immensely high.

5 DEVELOPING THE NSP

The NSP 2016-2020 was used as the key background document for preparation of a funding proposal for a new Global Fund grant covering the period 2018 - 2020. The Global Fund provided substantial financial support for the implementation of the NSP 2018 - 2020, including a significant amount of above allocation funding. Due to the favorable funding situation, the NTP was able to exceed several NSP indicators.

The current Global Fund project will last until the end of 2020, and therefore the preparation of a new funding request to the Global Fund is required during 2020. Although the current NSP covers the period until 2020, the NTP has decided to prepare a new NSP covering the period 2021-2025, to provide strategic guidance for the preparation of the funding proposal. In preparation for the NSP development, the NTP performed a Joint Monitoring Mission (JMM) to assess the current performance of the program and provide guidance for the development of the new one. The National Strategic Plan 2021-2025 takes full account of the recommendations made during the Joint Monitoring Mission conducted in September 2019.

TIMELINE:

6 THE NSP FOR TB ELIMINATION 2021 -2025

NTP policies and strategies are aligned with the WHO's End TB Strategy in 2015[6]. Building on the End TB Strategy's Three Pillars

I. INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION
II. BOLD POLICIES AND SUPPORTIVE SYSTEMS
III. INTENSIFIED RESEARCH AND INNOVATION)

and following the key principles of government stewardship and accountability, strong coalition with civil society organizations and communities, protection and promotion of human rights, ethics and equity, and adaptation of the strategy and targets at country level, the NSP 2021-2025 describes key interventions and activities that will enable the NTP to achieve the End TB Strategy's Milestones for 2025 (75% reduction in tuberculosis deaths and 50% reduction in tuberculosis incidence rate) and targets for 2035 (95% reduction in tuberculosis deaths and 90% reduction in tuberculosis incidence rate). A summary of the End TB Strategy's components is provided in the table below:

6.1 END TB STRATEGY FRAMEWORK

VISION	A world free of tuberculosis – zero deaths, disease and suffering due to tuberculosis
GOAL	End the global tuberculosis epidemic
MILESTONES FOR 2025	75% reduction in tuberculosis deaths (compared with 2015) 50% reduction in tuberculosis incidence rate (less than 55 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis
TARGETS FOR 2035	95% reduction in tuberculosis deaths (compared with 2015) 90% reduction in tuberculosis incidence rate (less than 10 tuberculosis cases per 100 000 population) – No affected families facing catastrophic costs due to tuberculosis

[6] The End TB Strategy; Global strategy and targets for tuberculosis prevention, care and control after 2015; WHO, Geneva, 2015

PRINCIPLES

1. Government stewardship and accountability, with monitoring and evaluation
2. Strong coalition with civil society organizations and communities
3. Protection and promotion of human rights, ethics and equity
4. Adaptation of the strategy and targets at country level, with global collaboration

PILLARS AND COMPONENTS

1. INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION

A. Early diagnosis of tuberculosis including universal drug-susceptibility testing; and systematic screening of contacts and high-risk groups
B. Treatment of all people with tuberculosis including drug-resistant tuberculosis; and patient support
C. Collaborative tuberculosis/HIV activities; and management of comorbidities
D. Preventive treatment of persons at high risk; and vaccination against tuberculosis

2. BOLD POLICIES AND SUPPORTIVE SYSTEMS

A. Political commitment with adequate resources for tuberculosis care and prevention
B. Engagement of communities, civil society organizations, and public and private care providers
C. Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control
D. Social protection, poverty alleviation and actions on other determinants of tuberculosis

3. INTENSIFIED RESEARCH AND INNOVATION

A. Discovery, development and rapid uptake of new tools, interventions and strategies

B. Research to optimize implementation and impact, and promote innovations

6.2 ALIGNMENT WITH THE POLITICAL DECLARATION AT THE UN HIGH-LEVEL MEETING ON TB IN 2018

The first UN General Assembly high-level meeting on TB was held in New York on 26 September 2018, titled *United to End TB: An Urgent Global Response to a Global Epidemic*.

The main outcome of the meeting was a political declaration[7]. This reaffirmed the commitment of Member States to the SDGs and the End TB Strategy, and to the actions

[7] United Nations General Assembly. Resolution 73/3: Political declaration of the high-level meeting of the General Assembly on the fight against tuberculosis. United Nations; 2018

required to accelerate progress that were defined in the Moscow Declaration. Examples included:

- providing access to TB diagnosis and treatment within the context of improving policies and systems on each country's path towards achieving and sustaining UHC;
- preventing TB disease among those at most risk of falling ill through the rapid scale-up of access to preventive treatment for latent TB infection;
- mobilizing sufficient and sustainable financing;
- overcoming the global public health crisis of multidrug-resistant TB (MDR-TB);
- ensuring and pursuing multisectoral collaboration;
- addressing the economic and social determinants of TB infection and disease, giving special attention to poor and vulnerable populations and communities especially at risk;
- promoting an end to stigma and all forms of discrimination, including through the protection and promotion of human rights and dignity;

Member States also committed to new global targets. Two of these targets are for the numbers of people to be treated for TB disease (40 million) or a latent TB infection (at least 30 million) in the 5 years from 2018 to 2022. These targets build on and are consistent with the milestones for reductions in TB incidence and deaths set for 2020 and 2025 in the End TB Strategy. The NTP Bangladesh is fully committed to reaching the global targets defined during the UN high-level meeting and country-specific targets. For the purpose of developing this NSP, the country-specific targets for Bangladesh were updated for the period 2021-2025. These updated figures are shown in the table below.

Table 3 Country-specific targets for Bangladesh for the period 2021-2025

Indicator	Disaggregated by	2021	2022	2023	2024	2025
TB patients to be treated	Total	325,272	323,254	321,097	318,799	316,359
	Adult	295,998	294,161	292,198	290,107	287,887
	Children	29,274	29,093	28,899	28,692	28,472
MDR-TB burden		5,078	5,046	5,013	4,977	4,939
MDR Target		2,365	2,813	3,248	3,733	4,198
TB Preventive Therapy Targets	Total	185,560	285,300	349,340	450,000	550,000
TB Preventive Therapy Targets	Adult	124,802	215,099	276,612	368,905	467,521

Indicator	Disaggregated by	2021	2022	2023	2024	2025
TB Preventive Therapy Targets	Child	60,758	70,201	72,728	81,094	82,478

6.3 RESULTS FRAMEWORK

Indicators	Baseline	Targets 2021	2022	2023	2024	2025	Comments
Impact Indicators							
Tuberculosis incidence rate per 100,000 population	221 (161-291), WHO Global TB report, 2018)	219	215	211	207	203	
Tuberculosis mortality rate per 100,000 population	29 (18-42)	22	19	17	15	13	
Percentage of affected families facing catastrophic costs due to Tuberculosis	TBD	0%	0%	0%	0%	0%	
Outcome Indicators							
TB treatment coverage rate (Tuberculosis case detection rate)	75% (WHO Global TB report, 2018)	81%	81%	81%	85%	90%	
Proportion of identified eligible individuals for preventive therapy /LTBI completed treatment	TBD	50%	60%	70%	80%	90%	
Treatment success rate	94% in 2016 cohort (WHO Global TB report, 2018)	91%	91%	92%	93%	95%	
% of upazila having no stock-out of at-least one essential fixed dose TB medicine (4FDC adult, 2 FDC adult, 3 FDC child and 2FDC child) in past reporting period	TBD	0%	0%	0%	0%	0%	
Output Indicators							
Number of notified new TB cases	2,68,596 (WHO Global TB report, 2018)	292,745	290,929	288,987	287,129	285,250	
Number of MDR patients enrolled for treatment	1,228 (WHO Global TB report, 2018)	1,892	2,250	2,598	2,952	3,305	
Ratio of Tuberculosis cases among children (0-4 and 5-14 years old) and adult	4% (NTP MIS data)	5%	6%	7%	8%	10%	
Percentage of registered new and relapse TB patients with documented HIV status	1% (NTP MIS data)	33%	36%	38%	41%	43%	

Indicators	Baseline	Targets 2021	2022	2023	2024	2025	Comments
Incremental (%) allocation of domestic financial resources for TB program management	285 crore Taka in FY 2020 (Mid-term Program Implementation Report 2020, APIR 2019)	10%	15%	20%	25%	30%	

7. GOALS FOR NSP 2021-2025

This NSP outlines a new strategic vision (as illustrated in below table) for tuberculosis control that places emphasis on bold and innovative strategies supported by an enabling structural and policy environment to roll out the interventions nationally. The updated NSP tries to address the key issues that are creating challenges to the NTP from achieving the targets of eliminating Tuberculosis as a public health problem.

Pillar	Components	Strategies
1. INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION	A. Early diagnosis of tuberculosis including universal drug-susceptibility testing; and systematic screening of contacts and high-risk groups	1. Strengthened TB diagnostic system in public and private sectors 2. Improved capacity of the public and private providers to detect TB cases 3. Strengthened active case finding
	B. Treatment of all people with tuberculosis including drug-resistant tuberculosis; and patient support	1. Ensure universal daily regimen for TB cases and rapid scale-up of short-course regimens with full oral drugs for drug-resistant TB and DST guided treatment approaches. 2. Ensure continuous supply of TB drugs and diagnostics 3. Increase capacity of CDHs & CDCs for all forms of TB treatment & follow-up 4. Prevent the loss of TB cases in the cascade of care with support systems
	C. Collaborative tuberculosis/HIV activities; and management of comorbidities	1. Adopt effective strategies for co-morbid conditions
	D. Preventive treatment of persons at high risk; and vaccination against tuberculosis	1. Introduce systematic method for contact tracing and treatment for latent TB infection in contacts of bacteriologically-confirmed cases
2. BOLD POLICIES AND SUPPORTIVE SYSTEMS	A. Political commitment with adequate resources for tuberculosis care and prevention	1. Translate high level political commitment to action through intersectoral approach 2. HR reforms to include district level contractual supervisory cadre and dedicated staff for TB surveillance network in the country

Pillar	Components	Strategies
		3. Advocacy for increase allocation to address the resource gap
	B. Engagement of communities, civil society organizations, and public and private care providers	1. Strengthen capacity of the civil society/ TB survivor's association 2. Strategic engagement with professional associations
	C. Universal health coverage policy, and regulatory frameworks for case notification, vital registration, quality and rational use of medicines, and infection control	1. Strengthen and scale up the reporting system for TB 2. Patient-friendly adherence monitoring and social support to sustain TB treatment
	D. Social protection, poverty alleviation and actions on other determinants of tuberculosis	1. Elimination of catastrophic costs by linkages of eligible TB patients with social welfare schemes including nutritional support
3. INTENSIFIED RESEARCH AND INNOVATION	A. Discovery, development and rapid uptake of new tools, interventions and strategies	1. Build supportive structures for surveillance, research and innovations, and a cafeteria approach of interventions based on local epidemiological situation
	B. Research to optimize implementation and impact, and promote innovations	1. Expand the role of CDHS and CDCs and the Medical Colleges to include surveillance and as centers of excellence (COEs) 2. Redefining the role of NIPSOM, BSMMU, NTRLs to encompass the burgeoning need for evidence to support policy advice 3.Align and harmonize partners' activities with programme needs to prevent duplication

These have been informed by programmatic gap analysis and key stakeholders' consultation. The updated NSP sets the vision of the MOHFW on the need to strengthen health systems and address key challenges in the near future that include managing the disease in diabetics, malnourished, smokers and children.

Some others key functions – such as Outreach, EQA, Quality Control and Store Management will be shifted to the GoB. Implementing partners will not continue separate sub-store and will receive medicine from the GoB Store.

The NSP 2021-25 prioritizes GoB stewardship role in implementing the TB program activities and anticipating a huge role shift for the implementing partners. This change within the implementing partners will see having less staff and a streamlined infrastructure of treatment facility. However, NTP urges the donors to provide some key technical staff in the area of surveillance officer, laboratory diagnostics and M&E etc. until it is filled by the GOB.

NTP and partners will develop cascade divisional strategies and joint workplans at the Division level and below, led by each Division TB Expert. Partners will align their coordination support to the implementation of the plan. SOPs on implementation and coordination will be developed accordingly and a divisional plan to annex all SOPs.

The new NSP 2021 - 2025 identifies a path of action and internal functional modifications for its implementation to bring about essential improvements in the program performance. Following is the framework of the National Strategic Plan to Control TB:

PILLAR 1: INTEGRATED, PATIENT CENTRED CARE AND PREVENTION

7.1 Component/objective:

The following are the components/objectives under Pillar 1.

7.1.1 Early diagnosis of tuberculosis including universal drug-susceptibility testing; and systematic screening of contacts and high-risk groups

7.1.2 Treatment of all people with tuberculosis including drug-resistant tuberculosis; and patient support

7.1.3 Collaborative tuberculosis/HIV activities; and management of comorbidities

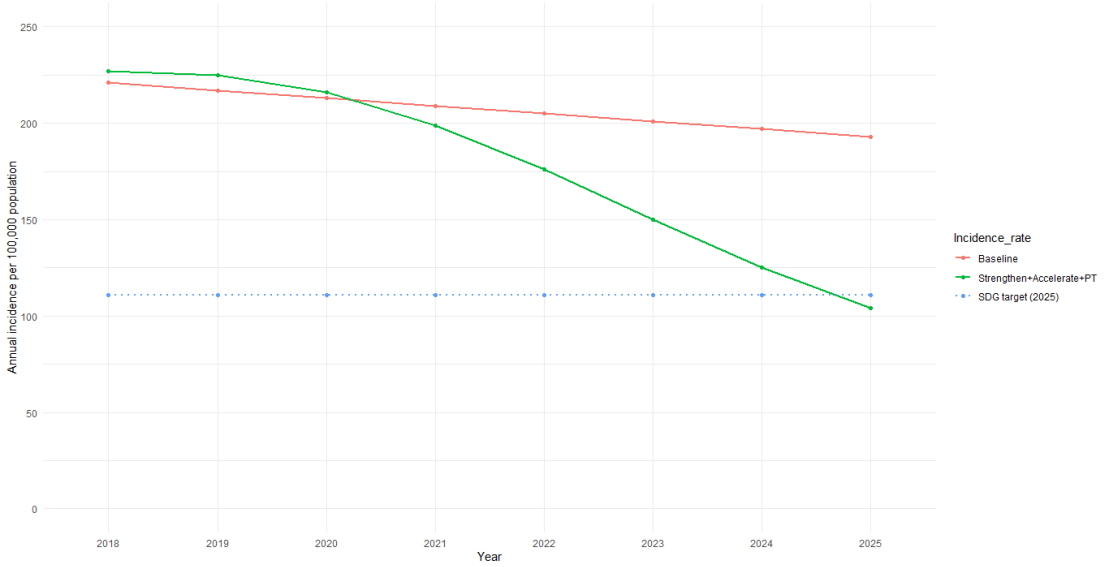
7.1.4 Preventive treatment of persons at high risk; and vaccination against tuberculosis

The potential impact of NSP interventions has been assessed using a recently developed dynamical model of TB transmission specifically addressing the situation in SEARO countries[8]. In high-level summary, the model explicitly captures the national TB programme (NTP) and non-NTP sectors, and the respective standard of TB care in these sectors. In doing so, the model also captures the implications of diagnostic delays and treatment outcomes, for overall transmission. For simplicity, the model does not distinguish age groups and is nationally aggregated. However, it incorporates HIV/TB co-infection, as well as 'risk groups' bearing a disproportionate TB burden, and the generation and transmission of drug-resistant TB (DR-TB).

The impact of the planned NSP activities on incidence is summarized in the graph below (figure 13), showing that NSP activities would result in a decrease of incidence of >50% by 2025.

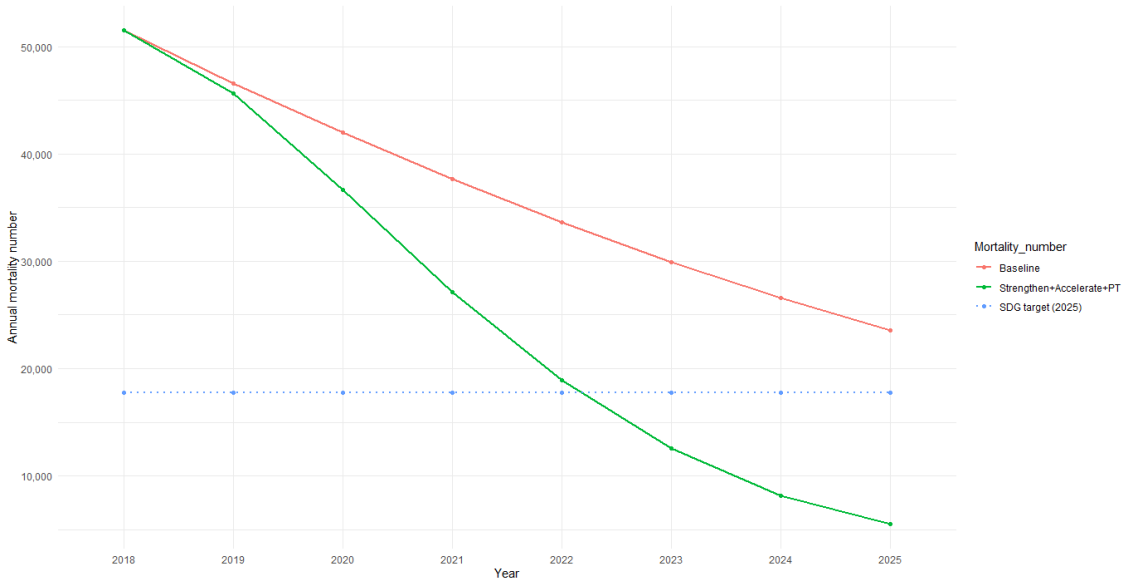
[8] Strategies for ending tuberculosis in the South-East Asian Region: A modelling approach. Indian J Med Res 149, April 2019, pp 517-527

Figure 13: Expected impact of NSP activities on TB incidence, 2018-2025



The impact of the planned NSP activities on mortality is summarized in the graph below (figure 14), showing that NSP activities would result in a decrease of mortality of >75% by 2025.

Figure 14: Expected impact of NSP activities on mortality, 2018-2025



7.1.1 EARLY DIAGNOSIS OF TUBERCULOSIS INCLUDING UNIVERSAL DRUG-SUSCEPTIBILITY TESTING; AND SYSTEMATIC SCREENING OF CONTACTS AND HIGH-RISK GROUPS

Although Bangladesh has made significant progress in different aspects of health, the early detection and access to universal drug susceptibility test remains a challenge. Each year, an estimated 120,000 TB patients remain undetected in Bangladesh, and addressing TB infection equitably and comprehensively is a challenge, particularly in urban settings. The

high rates of TB in urban areas and high-risk groups may be due to huge rural-to-urban migration, overcrowded living conditions with poor housing in slum areas, poverty, limited access to quality diagnostic and treatment services, and the complexity of a fragmented urban health care delivery system.

To eliminate TB and prevent emergence of MDR-TB, it is critical to improve access and coverage of quality diagnostic and treatment services for TB patients. Thus, real progress against the TB epidemic in Bangladesh requires a paradigm shift, innovative approaches, and new ways of working to identify each undetected TB case remaining in the community.

Following are the key strategic interventions that will help the country to ensure Early diagnosis of tuberculosis including universal drug-susceptibility testing, and systematic screening of contacts and high-risk groups:

***7.1.1.1** Strengthened TB diagnostic system in public and private sector*

***7.1.1.2** Improved capacity of the public and private providers to detect TB cases*

***7.1.1.3** Strengthened active case finding*

7.1.1.1 Strengthened TB diagnostic system in public and private sector

A strengthened diagnostic system is essential for early detection and effective TB case management. The early detection can be ensured by identifying the presumptive cases at the first point of care and linking them to the best available diagnostic tests.

Bangladesh started to use GX in 2012 and established the connectivity between 39 GX instrument from mid-2017 via GX Alert. GX instruments, modules and sites have more than doubled this year as compared to 2017. GX test activity followed the same trend of increase reaching 143,594 cartridges used as of 30 September 2018 including 49,669 GX tests performed among Drug Resistance (DR) presumptive TB persons and 93,925 GX tests among drug sensitive (DS) presumptive TB patients.

Bangladesh is currently equipped with 194 GX instruments placed in 175 BMU health facility sites offering a capacity of 860 GX modules in 2018. The 171 sites are equipped with GX instruments of 4 modules, and 4 sites with several (7) GX instruments of 16 modules, reaching a GX instrument coverage of 1 TB health facility equipped with GX instrument for 950,000 habitants or 1 GX module for 190,000 habitants

The NTP has a three-tier laboratory network system for the diagnosis of Tuberculosis. The NTRL, RTRL, and peripheral laboratories. In TB facilities equipped with X-ray equipment and GX instrument, CXR is performed as a filter for presumptive TB case presenting to the health facility with symptoms before GX test. Only abnormal CXR are eligible for GX test. In some TB facilities where no other test than CXR is used, a CXR register is available and provide some information on the number of presumptive TB cases. However, since some presumptive TB persons are submitted to the previous AFB algorithm, the number of presumptive TB cases submitted to CXR may not represent the total number of presumptive TB cases as previously estimated by the number of AFB smear examinations performed for diagnosis in the laboratory register before 2012 when AFB was the only path for TB diagnosis. In many TB sites with X-ray equipment and GX instrument, the mission noted that both the new and the

previous diagnosis algorithm are performed in the same setting with unclear repartition between presumptive TB patients receiving Xray and GX versus AFB only.

Gaps in Diagnostic network

There has been steady improvement in microscopy services in Bangladesh contributing to increasing numbers of smear positive TB cases with the overall positivity rate (Smear Positivity or SPR in tested specimens) at 6.9 -7%. The laboratory consumables/reagents for both ZN & FM microscopy services are of good quality and there have been no interruptions in laboratory supplies. The smear microscopy network is quality assured by 40 EQA laboratories which supervise and perform random blinded rechecking based on national sampling using the WHO EQA guidelines. Microscopy EQA coverage by rechecking has been close to 100% and is being conducted systematically.

The following gaps related to laboratory services have been identified:

i. **National TB Reference Laboratory (BSL2+):**

- There is scarcity of space for proper functioning of this laboratory to enable it to function properly as a NTRL. There is an urgent need for remodeling or expansion of this laboratory or a change of location to a more spacious location.
- Basic equipment maintenance is performed but key instruments (thermocycler, centrifuges, GT-blot, BSCs, etc.) have not been calibrated recently. The containment lab has not been adequately serviced, maintained and operated.
- There are many vacant staff positions including laboratory coordinator, microbiologists and medical technologists.
- Staff in the NTRL have not been trained. Only two self-trained persons are available to carry out the LPA testing. Delays in specimen processing for the LPA testing and interpretable results are not uncommon.
- Specimen transport from peripheral centres is still challenging (70% samples are from the periphery) and the long transit time is thought to negatively impact LPA and culture performance.
- Supervision and monitoring functions of the NTRL are inefficient due to several reasons including a shortage of supervisory staff and limited capacity to perform on-site evaluations.
- The national TB laboratory network is not functional with formal linkages at all levels (SRL, NTRL, RTRL, Gx & MC labs) due to the reasons cited above.
- A formal training calendar with specific training for all staff of the network is not available.

Most of the staff are supported, remuneration wise, by partners which could be a threat to sustainability of services in the absence of donor support**.**

ii. **Regional TB Reference Laboratories:**

- None of the RTLs offer 1st or 2nd line LPA.

- The laboratories at Khulna and Rajshahi do not have capacity for liquid culture and the Rajshahi RTRL is not able to carry out both liquid and solid culture, but instead carries out slide culture which has not been validated as a useful tool in TB bacteriology.
- State-of-the-art BSL3 facilities are only available at the Sylhet RTRL.
- There is no functional linkage with NTRL for supervision and monitoring of the activities of the RTRLs and there is no technical support to the RTRLs to fully establish and operationalize these laboratories as RTRLs. Panel testing and certification process of RTRLs is not established systematically.
- In some RTRLs limited training on ZN/LED microscopy has been provided, however, sustained and enhanced training is constrained by a shortage of audio-visual training equipment and furniture**.**

iii. **Microscopy:**

The quality assurance measures for this service requires strengthening as fluorescent smears may give false positive results (due to artefacts) and require constant supervision and monitoring. The selection of slides for EQA rechecking needs to be revised in line with the increased SPR. It was also noted that the supervision from central level for EQA activities is not fully operational and appears to be sub-optimal.

iv. **GeneXpert:**

- Most of the GeneXpert facilities are underutilized despite non-restrictive criteria for GeneXpert use in the new diagnostic algorithm, which states that all presumptive cases will be tested after X-ray screening, or, if no X-ray is available, directly with Xpert.

- The capacity for collection and transportation of non-sputum samples for GeneXpert test at the RTRL level is not adequate, because there are no SOPs for handling these specimens and the NTP has not yet formally introduced testing of non-sputum samples
- Many GeneXpert sites are reporting more errors which indicates that there may be issues with the environmental conditions of the laboratory facilities, specimen processing and temperature control among others.
- Despite funding provided though the Global Fund, there have been delays in pre-installation renovation of sites and procurement of complementary pieces of equipment such as UPS at the sites identified for installation of GeneXpert
- There is no functional linkage for supervision and monitoring of RTRLs and technical support for establishing and operationalizing all the RTRLs is behind schedule. Panel testing and certification process of RTRLs is not established systematically. RTRLs also have not been provided with the finances necessary for them to undertake supervisory visits to labs lower down in the network that are in their regions. The supervisory skills of the staff at the RTLs has not been developed.
- EQA for GeneXpert has not yet been introduced.

Activities to address the gaps:

Strengthen the laboratory network for TB:

Under this strategy, several activities will be performed to improve the overall performance of the laboratory network. Regular supervision and monitoring of all laboratory sites, including GeneXpert facilities, will be ensured. Accreditation of NTRL and RTRLs by the Supranational Reference Laboratory will be ensured, and annual maintenance contract will be ensured for all reference laboratories. NTRL to peripheral lab certification/accreditation process will be ensured. Medical Technologists (Lab) will be recruited exclusively for TB at the peripheral level. 100% training coverage of field level MT(Lab) will be ensured, as well as annual overseas laboratory training/meeting/study tour for lab personnel. Laboratory related operational research and cost-effective analysis of different lab tools, e.g. time to diagnosis, time to treatment gap and feedback time notification rate etc. will be supported.

i. Revise and update national laboratory strategy

The National TB laboratory Strategic Plan (2016-2020) will be revised as a holistic lab strategy. The country's vision for switching from microscopy to rapid molecular diagnostic tools as the initial test would be a paradigm shift to accelerate the uptake of rapid molecular diagnostic tools for increasing detection. The revised National TB Laboratory Strategic Plan will put more emphasis on implementing this objective with the changing diagnostic landscape.

ii. Molecular diagnostic roll-out plan

NTP Bangladesh is in the early phase of expanding the network of GeneXpert machines and currently has 224 GeneXpert machines in operation. There is a plan to roll out 210 GeneXpert machines by 2020 and an additional 180 GXp from 2021-2023. To ensure quality results which are accurate, reproducible and timely, a comprehensive and standardized quality assurance system will be implemented in all clinical and testing sites providing Xpert MTB/RIF testing services under NTP Bangladesh. Quality assurance activities for the Xpert MTB/RIF test should be integrated with quality assurance for TB smear microscopy and/or other testing, where possible. All sites shall be registered and undertake regular EQA as part of the GeneXpert quality assurance. A phased replacement of microscopy by rapid molecular tests is planned and the existing capacity and resources (facility, HR etc) will be utilized to ensure efficiency.

Real-time monitoring of GeneXpert machines in 38 sites through GXAlert has contributed to reduce error rates and shorter turnaround time for module replacement and improved the overall maintenance. Data analyzed through GXAlert shows that most common GeneXpert instrument and Xpert MTB/RIF test errors are due to incorrect processing of samples. A high error rate (errors 2008, 5006, and 5007) spread across all modules suggests that operator error may be a cause for which onsite re-training of staff may be necessary. RTRL Coordinator or GeneXpert Focal Points should compile a list of recommended candidates for re-training, in addition to new personnel. The list should be communicated to the GeneXpert Focal Person to arrange re-training. Preferably, candidates should be mentored on-site to ensure that training is successful. GxAlert has strengthened and improved programmatic decision making for cartridge procurement, distribution, and management. The GxAlert system needs to be scaled up to cover all the GeneXpert sites across the country in order to reap the full potential of this connectivity system.

Damage and inappropriate use or storage of cartridges can all lead to high rates of invalid results. Upon obtaining multiple invalid results, the operator should record the batch number. If a pattern is detected (high rates of invalid results linked to a batch number), they must report it to their Designated Laboratory Person who may consult the GeneXpert Focal Person.

Troubleshooting at sites (including calibration, electrical problems with the UPS) is documented by the GeneXpert Focal Point using the Supervision Checklist. Unresolved issues will be forwarded to the GeneXpert Focal Person for further investigation and resolution. An Authorized Service Provider (ASP) is an agency tasked by Cepheid to provide installation, troubleshooting and support to Xpert MTB/RIF testing sites on their behalf. NTP has established contracts with the ASP.

iii. Rationale for replacing all ZN microscopes by Light-emitting diode fluorescence microscopy (LED FM) while moving to rapid molecular diagnostic tests

NTP has 1,145 microscopy centers, of those approximately 345 are ZN microscopy centers and 800 are LED FM centers. Currently, there are 400 LED FM microscopes in the NTP central warehouse at Shaymoli. These LED FM microscopes will be installed by phases and would be enough to replace the remaining ZN microscopes centers across the country.

iv. Improvement plan for NTRL and RTRLs

The revised National TB Laboratory Strategic Plan will have the improvement plan for NTRL and RTRLs in the sections of the plan - Structure of the laboratory network, Infrastructure of the laboratory network including biosafety, Human resources for the TB laboratory network, Equipment maintenance and validation, Laboratory quality management systems, Management of laboratory commodities and supplies, Laboratory information and data management, Sample transport and referral system, Operational research regarding the TB laboratory network. Partners including USAID funded the Infectious Disease Detection and Surveillance (IDDS) project will support development of ToRs for NTRL/RTRLs. The objectives for developing the TORs for the NTRL and RTRLs is to formalize the structure within MOH&FW system and ensure their oversight responsibilities that has been outlined in the National TB Laboratory Strategic Plan 2016-2020. The approved TORs will also help develop a roadmap to strengthen and sustain the institutional capacity of the NTRL and RTRLs to achieve the vision and mission of NTP.

v. Use of culture and LPA functionality

Currently, there is only one functional LPA (NTP), one in BITID to be functional soon, one in a warehouse, three in the pipeline (GF supported) and two more with IDDS support. IDDS will provide technical support to introduce DST for new drugs/ other drugs. The liquid culture will be used to monitor the treatment prognosis of DR TB patients and to conduct the DST for new drugs

vi. Ensure the quality of TB Diagnosis

NTP will put additional emphasis to increase the percentage of bacteriologically confirmed TB cases using GeneXpert and monitor trends of clinically diagnosed cases at different facilities (public and private). Records of all clinically diagnosed TB patients for reference and verification will be kept at the facility level as needed. In addition to NTRL, the sample collection and processing facility to diagnose EP TB (providing FNAC needle, tissue grinder etc.) will be set up at RTRLs and Medical College Hospitals to improve the number of bacteriologically confirmed TB cases. Laboratory tests recommended for diagnosis of EPTB are culture and Xpert MTB/RIF and histopathology.

vii. Strengthening capacity in diagnosing child TB

There is a need for training with focus on building the capacity of clinicians/pediatricians and health care workers at the primary and secondary level for early diagnosis of childhood TB. Current laboratory practices for detection of TB in children are the same as for adults. The current WHO recommendations for the use of Xpert MTB/RIF also apply to the use of Ultra as the initial diagnostic test for all adults and children with signs and symptoms of TB.

viii. Ensure correct quantifications of the lab reagents, coordination, information management and supply chain

NTP quantifies the lab reagents based on the demand generated from each divisional level. There is a need to further strengthen the coordination of support from different stakeholders. A narrative of this topic will be included under the section - Management of laboratory commodities and supplies of National TB Laboratory Strategic Plan.

ix. Strengthening the sputum specimen transportation system

The accessibility to molecular tests is proportional increasing with the expansion of the GeneXpert network at the sub district level. The country's current practice is referral of people with presumptive TB to diagnostic sites for tests in most cases. Specimens from some of the outreach centers, prison etc. are transported to the nearest GeneXpert sites. Sputum transportation is mostly needed for DST (from GX sites to C-DST/LPA sites) and for treatment follow-up of patients with DR-TB. A clear specimen transportation system has been included in the SOP and the Lab Strategic Plan

x. Ensure proper lab waste disposal

Waste management is performed according to the national regulations and facility practices. Waste in peripheral labs is mostly burnt in either pits or drums in an open fire. Phenol and alcohol solutions are used as tuberculocidal disinfectants. There is an autoclaving and incineration facility at NTRL and RTRLs. In the city corporation areas, medical waste management organizations are there to manage waste under the supervision of City corporation and department of Environment. However, the need is critical for assessment of the lab waste disposal throughout the country.

xi. Ensure the availability of functioning X-ray facilities at all CDCs

The functionality of existing X-ray machines should be ensured (maintenance, capacity, training) at all levels. CDCs and CDHs will be equipped with X-ray systems. 54 digital X-ray units are in the procurement process (through GF UQD). 55 digital –x-rays units will be placed in CDCs (from saving/current grant). X-ray services could be outsourced for screening

(private faculties, reimbursement) if needed. However, this needs further discussion/clarification and should be aligned with the diagnostic algorithm.

xii. Ensure regular maintenance of all diagnostic equipment

Advanced diagnostic technologies such as gene Xpert or LED microscopy require ensured regular maintenance of all equipment for diagnostic accuracy. Under this strategy, the maintenance of advanced equipment will be ensured through the establishment of equipment maintenance/repair contracts at the time of purchase.

xiii. Capacity building for collection and processing of non-sputum samples to increase EP TB & child TB case detection

The diagnosis of tuberculosis in extrapulmonary- and child-TB cases requires the collection of non-sputum samples and preparation for processing by Gene Xpert. Under this strategy, the NTP will ensure the preparation of the required SOPs as well as the adequate training and supervision of all staff involved in this activity.

xiv. Establishment of a standard EQA system for Xpert to ensure quality laboratory services

To ensure quality laboratory services, the NTP will introduce a standard EQA system for Xpert with the use of an EQA panel for GeneXpert laboratories prepared by NTRL and respective RTRLS.

xv. Improve the quality of smear microscopy services

The quality of smear microscopy services is currently suboptimal in many diagnostic facilities. Contributing factors are insufficient training of laboratory staff, inadequate EQA mechanisms, and work overload of staff in laboratories with a high number of TB smears using the Ziehl-Neelsen technology. This strategy will focus on retraining of Upazila and collection centre staff and the education of experienced EQA technicians to become good laboratory supervisors who assure supportive, problem-solving supervision. NTRL and RTRL will be actively involved in supporting the EQA and improvement of performance. The strategy will also assure adequate internal quality control of staining solutions prepared at EQA and reference laboratories. In addition, the strategy will replace all ZN microscopy with LED FM in all sites by 2022. Effective implementation of the LED FM technique will require excellent logistics for sensitive staining reagents; an assured stock of LED-FM spares (converters, lamps); the provision of brief standard operating instructions or bench aids for LED FM; and assured internal and external QC of LED-FM (positive control smears; monitoring rates, rechecking).

7.1.1.2 Improved capacity of the public and private providers to detect TB cases

Bangladesh is home to some of the world's largest and most successful NGOs. NGOs in Bangladesh have gained global prominence for their size, scope and success with portfolios spanning microfinance, health and education services, social safety-net programs, agricultural extension, environmental protection, water and sanitation provision, disaster management, legal and human rights education, and capacity building. In addition, private

providers in both the formal and informal sectors play a significant role in health care provision and are frequently the patients' first contact point.

There is strong government ownership and stewardship of the TB response, including engaging with public and private care providers. This is especially the case in rural areas of the country, where TB services are embedded in effective systems of public primary health care that are supported by well-aligned implementing partner NGOs. Community level workers in rural areas (including community health care providers (CHCP) and health assistants (HA) from the government side, and Shasthya Shebikas and other community volunteers from NGOs greatly increase the capacity of the TB response. They increase the bandwidth of the NTP to screen, refer, register and provide treatment support to people with TB.

Public-private mix (PPM), or the involvement of all care providers, is particularly important in Bangladesh, where 84% of presumptive TB cases who sought care in an urban setting went first to the private sector, whereas only 16% went directly to a DOTS facility. A substantial proportion of the missed TB cases in 2015 (43 % of all estimated cases) are believed to be diagnosed and/or treated by the private sector. There are more than 90,000 registered physicians in Bangladesh, 53% (approx.) of whom operate exclusively in the private sector. Currently different approaches are being implemented by partners and NTP, but still many patients are seeking care from private sectors. Delay in care seeking is also an area to look into in order to reduce the transmission and subsequently the incidence by providing effective early diagnosis and prompt treatment.

There are strong linkages between the private and public health services in rural areas: for example, patients sent for GeneXpert testing to government/NGO run facilities were often referred there by private practitioners, and TB patients registered in Upazila Health Complexes (UHC) are referred from different sources including private practitioners. Another evidence of the successful management of the NTP in rural areas is that it is difficult to find TB drugs being sold in private pharmacies. Instead patients are referred to the UHC for free TB treatment. While there is no law stopping private pharmacists from selling TB drugs, government supply of free TB drugs through DOTS facilities may have effectively crowded out private drug sales.

Gaps in Provider's Capacity

- Inadequate human resource at different levels and capacity building is a challenge of the public health sector. Recruitment, retention and continuous capacity building and standardized monitoring are required. Human resource system strengthening is crucial especially in new and emerging issues of TB control.
- Although the DOTS Hospital Corners are a valuable link between the NTP and large hospitals, there is scope for more collaboration in this area. There are lost opportunities for intensified case findings at large hospitals where all/most out and in-patient attendants could be screened for TB, a task that could be handled by DOTS Corner staff. Moreover, all large hospitals do not yet have DOTS Corners.
- The National TB prevalence survey 2015-2016 reported that about one third of the TB symptomatic cases either do not seek treatment or sought late. About half of the patients visited private providers or facilities as the first care seeking place.

- The majority of these TB symptomatic cases visited pharmacies or drug sellers for their first care followed by other private providers which included village doctors, graduate medical practitioners and private hospitals. The survey shows that a large proportion of the patients seek care from the private providers, but the diagnosis capacity of the private providers is unknown.

- In some facilities and among certain providers (college hospitals, private providers) a large proportion of patients are clinically diagnosed and there are extra-ordinarily high proportions of extra-pulmonary forms of TB (53% in one health facility). These observations raise concern about the quality of TB diagnosis in these settings.

- There is a need for training with focus on building the capacity of clinicians/pediatricians and health care workers at the primary and secondary level for early diagnosis of childhood TB.

- In rural areas TB services are embedded in effective systems of primary health care that are supported by implementing partner NGOs. The private health sector in Bangladesh is large, diverse, growing and the first point of care for a large proportion of people when they become ill. NTP and Partners have engaged with the private health sector where TB patients are being managed by untrained people, without following the NTP algorithm.

- Currently TB diagnostic centres implemented by partner NGOs require a substantial amount of resources for running these facilities at rented places with dedicated HR. Though these centers are diagnosing a large number of TB cases now, the question remains how it could be more cost-effective and owned by the government for long term sustainability. Additionally, after country wide expansions of GeneXperts and Digital X-rays in different government facilities, the performance/yield of these TB diagnostic centres may be affected in future; as it is seen now in many urban TB diagnostic centres with reduced number of presumptive cases or underutilized. Thus, the geographic locations and management arrangements may need to be reviewed also for possible adjustments.

Activities to address the gaps

After decades of TB Program Implementation, it's inevitable to standardize the service delivery protocol in the continuum of TB care in public-private-NGO facilities and community level to ensure a-people-centered TB services at all level of service delivery. The following strategic initiatives will be incorporated in the updated PPM strategy:

- ***Develop SOPs on referral mechanism*** *of TB service delivery for public- private-NGO facilities* to optimize TB care and responses: Considering the diverse nature of TB service delivery models, it is mandatory to develop SOP on TB referral mechanism to optimize TB care and response with clearly defined care pathways.

- *Develop SOP to define the* ***functional integration between GoB and NGO staff*** to optimize the Human Resources capacity and efficiency for effective TB care.

- ***NTP to continue long standing strong and beneficial partnerships*** *with various NGOs*. An integrated service modality of GO- NGO will be standardize d by SOP for increased

service efficiency and harmonizing TB care at every service delivery level. NGO will no longer use separate infrastructures at union, Upazila, district level and NGOs staff will be embedded at GoB facility at respective service delivery point. Field staff such as HA, CHCP (Community Health Care Providers) and Multi-Purpose Volunteers will enhance their role in active case findings activities at the community level.

- ***Service integration:***

  Organize co-ordination meeting with other Health Department for promoting an integrated patient—centered approach (Integration with Nutrition, MCRAH, MNCAH, IMCI, NCDs, Cancer, Renal Transplantation, Diabetes). Identify potential opportunities for service integration with other health programs.

- ***Strengthen TB Control at large medical college hospitals*:**

  The average number of persons who are seen in at the outpatient departments of large medical college hospitals is in excess of 3,000 to 5,000 daily. Between 25-30% of these persons or 1, 250 persons seek care for respiratory symptoms. Of these about 1.5% (18 persons) will have TB. Thus, on average a large medical college hospital should be notifying over 5,000 TB patients each year. Currently medical colleges have relatively low TB cases notified suggesting gross under diagnosis of TB. Similar situations are seen in District Hospitals. To address this issue and to identify the missing TB cases, NTP plans to deliver integrated TB program management in collaboration with NGO Partners and, will ensure regular co-ordination, and capacity building initiatives for service providers to ensure skill mix. For sustained TB Control NTP encourages the formation of committees at large medical college hospitals and to continue multi-department co-ordination meetings to monitor progress on TB care prevention.

- To ensure a standardized TB care, the new diagnostic algorithm will be printed and distributed to all service delivery points (Public, Private and NGOs.)

- NTP will promote integration of the TB program with other special service delivery outlets – such as, Army, Police, BDR, Port, EPZ facilities to find more missing TB cases.

- NTP will review the TB care pathways in a periodic manner to evaluate the progress and identify the bottleneck and address them accordingly.

- NTP will strengthens involvement of professional organizations (BMA, BPA, intern doctors).

Expand and strengthen on-going in-service training for all health workers involved in the implementation of TB Control

The NTP is responsible for training all categories of health workers (medical doctors, nurses, laboratory technicians, paramedical staff, field-level staff, community health workers and volunteers, NGO staff, corporate sector health workforce, graduate and non-graduate private practitioners) at all service delivery levels. Partners can be involved based on their comparative advantage.

In-service training programmes for different categories of health workers involved in the implementation of NTP activities will be updated to include new developments in different components of TB control. A comprehensive training package will be developed to strengthen the involvement of strategic partners.

Course facilitators/master trainers for the different training programmes will be trained with particular attention to the technical and educational competencies with a special focus towards independent thinking and problem solving for quality implementation of TB services. A mechanism will be developed for improving the quality of training courses conducted by the master trainers on a continuous basis. Training courses will be prepared in close collaboration and coordination with other priority health programmes and NTP partners. To the extent possible, integration with other disease control programmes will be pursued. Supervisors will be additionally trained to ensure better implementation.

Follow-up activities will be conducted at the relevant sites to monitor post-training implementation. This will help trainers to provide supportive supervision to service providers, help to utilize their skills and knowledge acquired during the training and promote application of what was learnt. It is expected that this will result in a further improvement of the quality of services and in the identification of performance gaps and future training needs.

Attention will be given to the proper design of basic training courses as well as refresher courses. The basic TB management courses on patient care will be offered to medical doctors and supervisors at all levels including partners. This course will be complemented by specific training courses on procurement and supply management and on managing information for action (MIFA). The NTP will concentrate on building capacity of civil surgeons and UH&FPOs on a continuous basis. The training courses on basic laboratory diagnosis, EQA, culture and DST and new diagnostic tools will be offered to the relevant laboratory technicians. The mid-level course generally targets all paramedical staff based in upazilla and district health facilities while the field-level modules are intended for community health workers and volunteers. Other training courses/orientations should be tailored to the staff needed for implementation of various sub-components of TB control.

Participation to international training courses and sharing of experiences through attending international meetings, congresses and conferences will acts as an incentive for improving programme performance. Managers and supervisors in various levels will participate in regional or global meetings. The NTP will prepare a plan for international training based on capacity gaps and according to the strategic outlines. Criteria will be defined for potential participants to international training courses, meetings or exchange visits.

The NTP is in the process of developing a computerized system for training, to be linked to programmatic data so that training courses will be prioritized based on identified gaps. This data base will be further developed.

Provider capacity building for childhood TB and extra pulmonary TB

This will be key to impart appropriate skills and knowledge about child and extra pulmonary TB to relevant health care personnel (HCP) in all tiers of the system through the professional organization. This needs careful analysis and planning related to the competencies that HCPs require to effectively carry out their tasks. This analysis will inform the development of

specific training modules. A dedicated training unit will have to be established to do this work.

Improve diagnostic accuracy through development of staff history taking skills

A driving factor behind the current low detection of retreatment cases appears to be the insufficient skill in history taking by staff diagnosing TB patients. Activities to improve history taking skills will include training on new classification of TB cases, new policies, new algorithms and new reporting format included in the revised National Guidelines and Operational Manual for TB Control, as well as the country-wide implementation of recently developed desktop guidelines on adequate history taking and appropriate diagnostic algorithms based on history

Strengthen Public-private mix (PPM) activities in TB control

NTP will review/assess the different approaches/interventions of PPM including through medical colleges, professional association and social enterprise model in 2020 and propose sustainable diversified interventions that will be owned by the government and suitable for patients and private providers by engaging different experts and partners in the country. After assessment, a comprehensive PPM strategic plan and workplan needs to be developed by the NTP for next phase implementation. Revised PPM models and interventions will be implemented in 2021 and gradually scaled up largely in urban areas where prevalence and missing cases are great as per the recent prevalence survey findings and where most of private providers operates.

7.1.1.3 Strengthened active case finding

Early identification of people with a high probability of having active TB (presumptive TB) is the most important activity of the case finding strategy. Screening and diagnosing patients with appropriate tests and strategies will largely determine the response to appropriate treatment.

Presumptive TB patients will be promptly identified and are to be referred to diagnostic facilities for appropriate investigation. Patients attending health institutions both in the public and private sectors need to be systematically screened for symptoms of TB by the health care provider.

Passive case findings alone lead to missed cases or delayed diagnosis. Enhanced outreach activities to detect more TB cases are critical to universal access. Screening for TB has to be undertaken at every point of contact among key population including clinically and socially vulnerable group of people.

Active Case Finding (ACF) is basically a provider-initiated activity with the primary objective of detecting TB cases early by active case finding in targeted groups and to initiate treatment promptly. It can target people who have otherwise sought health care with or without symptoms or signs of TB and also people who do not seek care. Increased coverage can be achieved by focusing on clinically, socially and occupationally vulnerable populations. It must be remembered that ‘screening’ is a dynamic process and the prioritization of vulnerable groups, choice of screening approach and screening interval will be regularly reassessed by the programme. Decisions on when and how to screen for TB, which vulnerable groups to

prioritize and which screening tool to use depend on the vulnerable group, the capacity of the health system, and the availability of resources.

Gaps in active case finding:

Child and Adolescent TB

Current epidemiological data suggests that TB is grossly under diagnosed and or underreported in the 0-4 years age group and this calls for enhanced TB case finding efforts in this particular age group given the documented evidence of higher mortality and higher rates of TB complications in this age group. Optimizing case finding in this age group provides an opportunity for the country to get back on track with continuing to reduce under five mortality, whose decline has recently stalled.

The following gaps related to childhood TB management have been identified by the JMM:

i. **Policy-practice gap**

Approved national guidelines and standard operating procedures (SOPs) are still unavailable at service delivery points and almost no-one is trained in child TB. Facility based systematic active case finding is not routinely implemented beyond the few areas that are implementing child TB projects. As a result, not all children presenting for health care at different facilities are screened for TB. Active TB case finding among children is also not routinely practiced under the "Integrated Management of Childhood Illness (IMCI)" and "Management of Severe Acute Malnutrition (SAM)" approaches being implemented at facility level with a focus on children under five. Further, sputum sample collection (especially for younger children) is implemented in a limited number of tertiary hospitals which implies that children have limited access to a rapid TB diagnostic test and DST.

ii. **Child and adolescent TB case finding and treatment**

Due to insufficient diagnostic skills of service providers as well as the lack of access to diagnostic tools, the diagnosis of child TB is frequently missed. There is inconsistent access to chest radiography (CXR) across facilities even when the national algorithm recommends CXR prior to microbiological testing. Furthermore, Mantoux Tests are almost never available and Gene Xpert capacity is uncommon and specimen collection facilities from children (gastric aspirate or induced sputum) rare.

Although adolescents are known to be a TB high risk population, adolescent specific data is not captured in national reports and therefore the burden of TB in this age group is incomplete.

iii. **PPM for child and adolescent TB**

There is limited engagement of paediatricians, especially in child TB notification, yet almost all pediatricians are involved in private practice and child TB management.

Gaps in urban areas

Although TB control activities should receive full support in both rural and urban areas in Bangladesh, special urban considerations should favor formulation of a specific approach. Factors that can adversely influence TB transmission include overcrowding, poor residential and work-related ventilation, clustering of high-risk congregate institutions and populations, disproportionate employment of health providers at risk of infection, and high concentration of migrants. Community-based prevention and service delivery platforms might also be relatively less developed and effective in urban than rural areas. Urban areas, however, might also provide better access to referral, diagnostic, treatment, and follow-up services for TB patients and offer more opportunities for them to receive services from qualified private-sector medical practitioners.

Constraints to Contact Investigations (CI) in Bangladesh

The 8th JMM in Bangladesh in 2019 showed that active TB yield (including child TB) from CI was as low as 0.4% in an urban area and 1.3% in a rural area. Internationally, constraints identified for the major gaps in CI are competing priorities, low awareness, infrastructural challenges, stigma, and inadequate access to care. Furthermore, the only NTP reporting requirement in CI is with regard to the numbers of children put on IPT. NTP has no current stipulations for CI reporting about the total numbers of CI carried out nor about how many active TB cases (child or adult) were detected as a result. This operations research will describe the factors hindering effective CI in Bangladesh.

Activities to address these challenges

a) **Design and implementation of active case finding activities targeting high risk settings**

Active case finding activities in high-risk groups is promoted by WHO as an effective means towards increasing case detection. This strategy will focus on the design and implementation of active case finding activities in hard to reach areas like Char, hill tract areas, tea garden including mass screening with X-ray targeting high risk settings such as prisons, slums, areas with high migratory populations, and other high risk groups (miners and other workers intensely exposed to dust, workplace- areas with high concentrations of informal sector workers) to increase case notifications. A mapping and situation analysis of these populations will be required, and successful models of screening, referral, diagnosis, and treatment will be standardized as NTP policies and expanded to cover high-risk populations across the whole country. Attention to gender will be an important element in the models. Rural issues will be analyzed given the particular challenges for both diagnosis and DOT due to long travel times and fewer community health resources.

b) **Design and implementation of activities to increase case finding among specific high-risk areas or population groups**

- **Urban areas**

An urban approach is recommended that will target high-risk geographic areas and populations and formulate and target interventions to address their needs. Attention will focus on defining an optimal and cost-effective package of services and the mix of public-sector, NGO, private-sector, and social network platforms for delivering them. Consideration

will be also be given to strengthening urban TB program system components that include monitoring and supervision; financing; electronic notification, recording, and reporting; referral and follow-up; rational use of medicines; and private sector and community engagement. Because case detection and notification rates are relatively low in Bangladesh, an urban approach will emphasize effective screening and passive and active case finding among migrant and floating populations and slum populations, workplace, prisons, people living with or at high risk of developing HIV, malnourished people, and children at risk in urban settings; attention will also be given on developing best-practice urban-based contact tracing and prevention therapy interventions in collaboration with MOLGRD. Mobile vans will used for screening prisons and workplaces.

- **Male population**

The recent prevalence survey consistently showed a higher prevalence of TB among the male population in all age groups. This strategy will address this specific epidemiological situation through the development of policies to provide easier access to care for the male population, such as the establishment of clinics providing services outside of regular working hours. Activities will be implemented to increase health seeking behavior of men.

- **Community system strengthening to enhance case detection**

Bangladesh has a long history of implementing community-based TB service provision. The community-based model was regarded as cost effective model. A large network of community volunteers (BRAC's Shasthya Shebika, village doctors, and cured TB patients) are engaged in TB control. These community groups have been complementing the need of field activities such as active case finding referral, contact tracing and treatment supervision. The SMC model engages blue star and green star pharmacy (aka. drug selling) outlets, and call center *(tele jiggasa*) are also functional. Successful models of community-based case finding activities will be expanded to all divisions and districts in the country. Government field staff such as HA, CHCP (Community Health Care Providers) and Multi-Purpose Volunteers will enhance their role in active case findings activities at the community level. A large numbers of opinion leaders and cured TB patients also have been oriented and support the TB control programme. As the majority of community volunteers are women, access for women to TB Programme also enhanced. Key affected populations within TB will be addressed based on the country level assessment of special/focused case finding activities (CRG tools, Stop TB partnership).

Taking into account, the SDG Goal 2030, the political declaration of UNHLM and the Stop TB partnership Global Plan to end TB and WHO End TB Strategy, the NSP 2021- 2025 prioritizes a new focus to establish the protection and promotion of human rights, ethics and equity, as well as strong coalitions with civil society organizations and communities, as fundamental principles essential to the tuberculosis response. This intervention seeks to implement this strategy through a comprehensive set of workshop, training and other community engagement activities.

Effective advocacy and communication interventions are of key importance to further increase case detection. Under this strategy, a revised plan for advocacy and communication will be completed and circulated to all stakeholders. The strategy will have the general Objective to create mass awareness and sensitization among stakeholders of National TB control Programme at all levels.

NTP and partners will conduct stakeholder workshop to develop standard content which will be used to mainstream the rights-based approach through different training and communication platforms. TB-related trainings with health care workers or community-outreach workers will integrate a strong medical ethics in line with the "Know your rights" document for TB prevention diagnosis and treatment. Media /TB day campaigns- will include 'stigma reduction' messages and 'Patient's rights' as well as the recent Declaration of Rights for TB patients. And thus, the rights-based approach will be integrated with the case finding approach considering patients confidentiality and protecting their rights. Orientation with local opinion leaders, cured TB patients will be held. These ongoing activities help to involve patient and community group, reduce stigma, maintain referral, and support new TB patients. A system of simple community monitoring will be initiated through these platforms. The consultative workshop will also focus on designing monitoring tools considering local contexts.

Strengthening community systems contributes to key national goals and to ensure that people's rights to health are realized. Engaging community and strengthening the system improves outcome for health and well-being; respect for people's health and other rights; protects social and financial risks; and improves responsiveness and effectiveness of interventions by communities.

- **Ensure the implementation of contact screening procedures at all facilities**

The screening of contacts of active TB cases for symptoms of TB is an important tool to increase case detection. While the new NTP Manual contains detailed instructions on the implementation of this method, the policies are rarely effectively implemented. This strategy will focus on the development of clear-cut operational guidelines and plans for implementation & monitoring, followed by training of all staff in contact tracing techniques, as well as the strengthening of supervision for this program component. In addition, local NGOs/CBOs will be mobilized through small implementation schemes.

- **Intensify facility based active case finding (ACF) among all children and adolescents with special attention to under-5s**

Facility-based ACF has resulted in detection of large numbers of children with TB across South Asia (Nepal, India, Pakistan) and most recently in Bangladesh. ACF will involve screening for TB in all children seeking medical care in busy health facilities with daily sick child attendance exceeding 50. Lessons learned from CTB's ACF of children will guide design including the use of screening techniques in busy OPD waiting rooms, where they will also be weighed and plotted on growth charts by screening personnel. Children with presumptive TB will be referred to trained doctors who will take appropriate history, examine them, order a chest x-ray, a Mantoux Test, and if needed, gastric lavage, induced sputum and stool samples for Xpert/Ultra. (see Flow Chart in Figure 14).

The programme will engage with leading local paediatricians/physicians for providing mentorship and case evaluation through the Bangladesh Paediatric Association (BPA). These mentors will be linked with local network physicians to provide rapid clinical guidance. The activity will be conducted in collaboration with the 1,600-member BPA which has decades of experience in conducting child TB training programmes for doctors and other health care providers. Telemedicine will be used for this purpose.

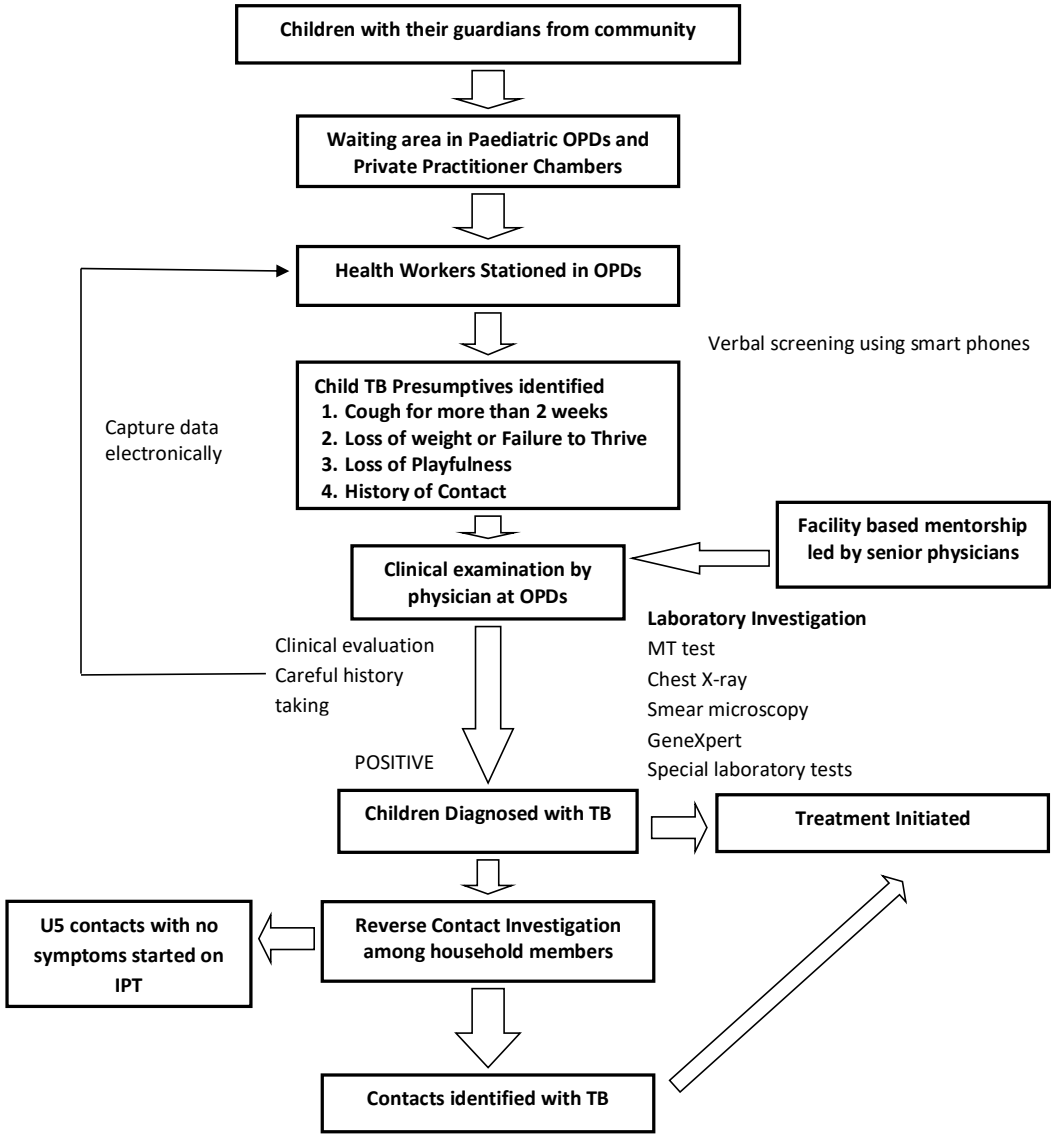


Figure 15 Facility based ACF Flow Chart

- **Strengthen community-based Contact Investigations (especially Home Contact Management [HCM])**

To reduce the burden of childhood tuberculosis disease and death, more children with tuberculosis need to be diagnosed and treated or prevented from becoming sick with tuberculosis in the first place. Preventing cases of tuberculosis is especially important in resource-limited settings, where the diagnosis of children with tuberculosis can be particularly challenging. The 2016 CI SOP under NTP stewardship, which has not been implemented, needs to be updated and rolled out across the country.

In rural areas, the SOP recommends the use of GoB and NGO Community Health Workers to reduce the workload of CI – thus each CI trained health worker will only need to do four CIs a year in his/her catchment area. A single CI home visit often does not bring the family to a facility for the child's assessment. Therefore, it is proposed that DOT providers in the community will also be trained to remind index cases every time they come for medication to take their under five children and symptomatic family contacts above five years of age for assessment by a trained doctor in the nearest UHC. Figure 15 below describes the data flow

from CI in rural areas as suggested in the 2016 SOP. This will be done through the use of handheld digital devices.

In urban areas, City Corporation/Municipality "Vaccinators" will need to be trained to carry out CI. The WHO latent TB infection application will be utilized for real time data entry and rapid, user-friendly data utilization in both urban and rural areas.

To begin the process, a three-month preliminary landscape analysis and baseline assessment of the CI scenario in rural and urban areas should be carried out to design a realistic CI programme. This will be in consultation with district (Civil Surgeons), upazila (UHFPOs) health managers as well as Chief Medical Officers in City Corporation/Municipalities. CI training will then be undertaken, and activities rolled out. Lessons learnt in the first year will inform further expansion in years two to five.

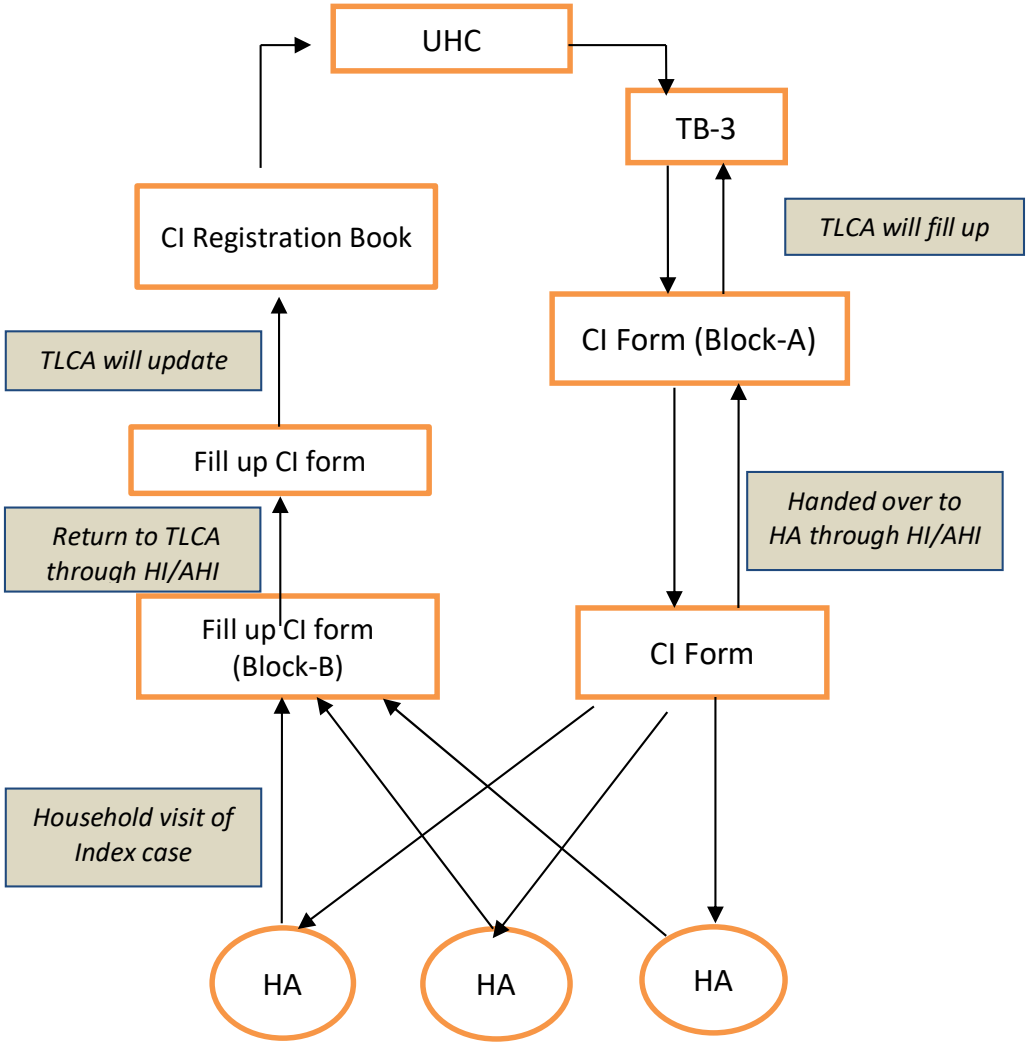


Figure 16 Data Flow in Rural Contact Investigations

- **Improved documentation and data management for childhood TB**

Aligning with the NTP vision of technology utilization, the current paper-based CI approaches will be transitioned to digital platforms, such as eTB Manager and the mobile applications developed under Challenge TB. Children identified with presumptive TB at facilities and during CI will be notified to the local basic management units (BMUs), linked to local DOTs

centres and engaged with DOT providers. Central data personnel will analyze the process of CI, notification and treatment outcomes to inform national policy. All of this will make child TB more visible for appropriate interventions.

- **Operations Research for childhood TB**
    a. Under or overdiagnosis of child TB by facility based active case finding

The above will be answered by a 10% sub-sample re-assessment of diagnosis by Child TB specialized pediatricians.

7.1.2 TREATMENT OF ALL PEOPLE WITH TUBERCULOSIS INCLUDING DRUG-RESISTANT TUBERCULOSIS; AND PATIENT SUPPORT

Bangladesh has maintained the TB treatment success rate above 90% for more than five years. The community-based DOT treatment is one of the reasons of this achievement. However, there are still high mortality rates of TB patients in Bangladesh. There needs to be some improvement in treatment adherence and in the monitoring and reporting of adverse events resulting from TB treatment. There needs to be a linkage between TB treatment and diagnostic facilities.

The use and expansion of the XpertMTB/Rif assay has been the mainstay of efforts to identify patients with MDRTB. Patients identified to have RR on testing with the Xpert MTB/Rif assay are further tested with line probe assays (see laboratory) for second line anti-TB drug resistance and culture with DST. The NTP has prioritized patients who fail treatment with first line anti-TB medicines (category i and ii) , those who do not convert to a negative bacteriologic test after two to three months of treatment, all returning patients after a period of loss to follow to up, close contacts of patients with MDRTB, all HIV infected TB patients and patients with extra -pulmonary TB who are not improving on treatment for drug susceptibility testing. The programmatic management of MDRTB was initiated in 2005 through an operational research project designed to test the programmatic efficacy of a short course regimen for the treatment of MDRTB. Since then a grand total of 6,420 persons have been treated for MDRTB (2018 NTP Annual Report). Patients with MDRTB are initially hospitalized for 1-2 months and then referred to peripheral PMDT sites and the community for ambulatory care.

Bangladesh pioneered the short regimen for the treatment of MDRTB, which up to date is referred to as the Bangladesh regimen by many and continues to register good treatment outcomes using this regimen.

However, there are some gaps in diagnosis and treatment of the DR TB.

Gaps related to Programmatic Management of Drug resistant TB

The following gaps related to programmatic management of drug resistant TB have been identified:

a. The Clinical management committees (CMC) for DR-TB at treatment sites either do not exist or are non-functional. Physicians at NIDCH are largely not involved in treating DR-TB patients, with the management of these patients in the hand of an individual doctor from a partner NGO. In peripheral PMDT centers treatment decisions are being taken by an individual doctor. No records of clinical management

committee meetings were found. Most of the doctors and clinical management committees where they exist, are not trained on clinical and programmatic management of DR-TB.

b. There are gaps in human resources including for key positions in hospitals and in the laboratory.
c. Newer drugs regimen for pre-XDR and XDR-TB are only available at NIDCH.
d. Some non-TB patients are hospitalized in TB wards which poses a significant risk of MDRTB transmission. Segregation is not happening between sm+ve and sm-ve pulmonary TB (PTB) patients.
e. Lack of skills in supervision and data analysis capacity for effective monitoring. The supervisors were never trained on monitoring and evaluation.
f. Diagnostic algorithm is not being followed at most of the sites and primarily GeneXpert testing is being done for presumptive DR-TB cases.
g. Availability of the chest x-ray is lacking in most public hospitals and even where x-ray machines are available, they mostly are non-functional. In most of the cases, chest x-ray is being done in the private sector.
h. Liquid culture is not routinely done and DST for second line drugs, other than Fluoroquinolones (FQ) and Second Line Injectable (SLIs), is not available.
i. Lack of coordination between CDHs and laboratory is evident and feedback to clinicians from NTRL/RTRL is not a regular practice. Linkage between government and NGO staffs is also weak.

Specialist physicians are not sending patients for TB testing. The opportunity of having these specialized doctors find TB cases is being missed due to lack of training in TB and insufficient linkages with the TB program.

Activities to address these gaps

7.1.2.1 Ensure universal daily regimen for TB cases and rapid scale-up of short-course regimens with oral drugs for drug-resistant TB and DST guided treatment approaches

- **Ensure quality of DOT in both rural and urban settings**

The provision of DOT through multiple providers including family members is a core strategy ensuring continued high treatment success rates. Distribution of DOT providers need to be revisited in future NTP program to ensure quality and coverage of DOT both in rural and urban settings. Upazila authority in rural areas and city corporation authorities in urban areas need to know to have the identity of DOT Providers who will do the regular supervision of TB Patient under his/her jurisdiction and will ensure appropriate management of side effects following a regular schedule in collaboration between the NTP and NGO partners. DOT providerswill receive documented feed-back on corrective actions taken on identified problems. The goal is to increase annual case detection of MDR- TB to 90% of incident MDR-TB cases by 2025 (from baseline of 21% in 2018), with Child MDR cases constituting >10% of the total number (from baseline of 0% in 2018), and improve management of MDR-TB cases through country-wide implementation of the all-oral MDR-TB treatment regimen

- **Ensure adequate diagnosis of patients with presumptive MDR TB at all NTP facilities**

The adequate diagnosis of MDR TB presumptives will require adequate history taking by all TB care providers and access to gene Xpert at all facilities. Under this strategy, the training of TB care providers will be intensified to ensure adequate history taking of previous TB treatment and subsequent correct classification of patients by health care providers.

- **Introduction of a new diagnostic algorithm and expansion of Gene Xpert sites to cover all upazilas by 2025**

The NTP will ensure universal access to Gene Xpert through the establishment of a broader, more inclusive algorithm and the expansion of Gene Xpert diagnostic facilities.

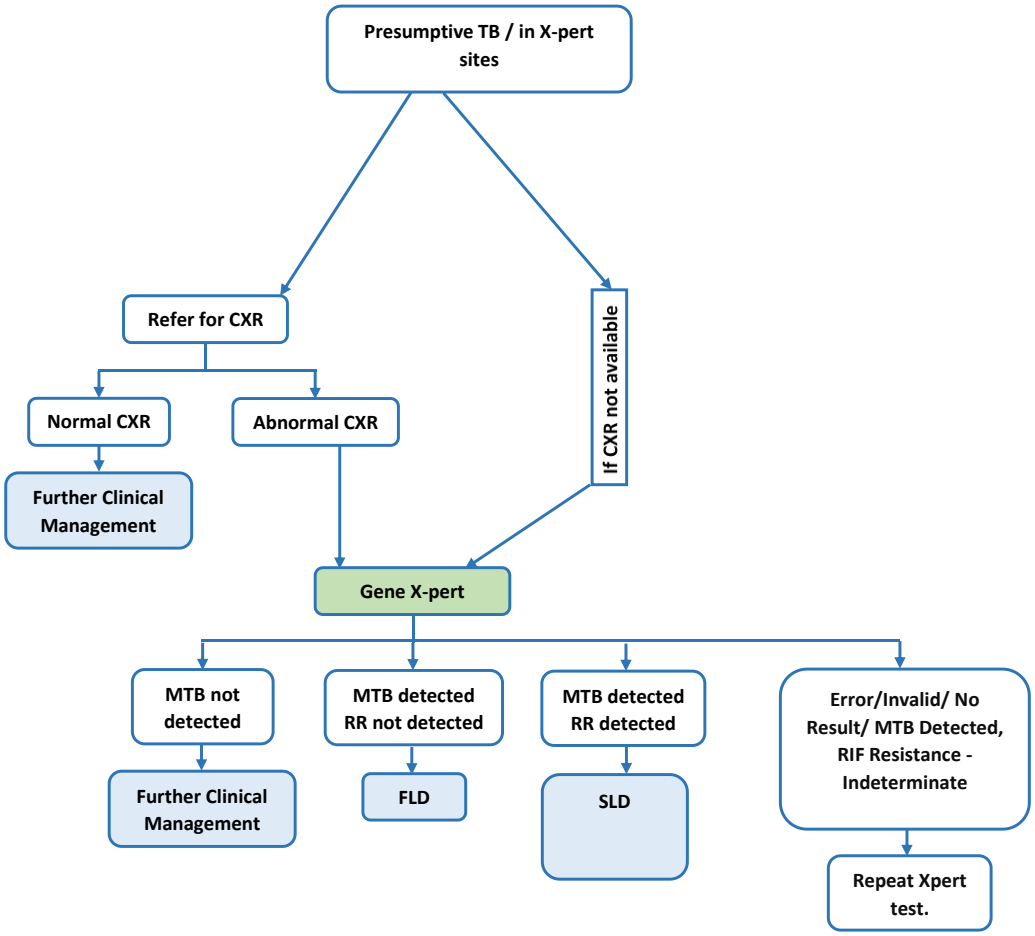


Figure 17: Revised NTP diagnostic algorithm[9]

The NTP revised the need for Xperts needed in the country. The total needs are:

Table 4: Revised needs for Gene Xpert facilities to cover all upazilas and large public/private hospitals as well as city corporation areas by 2025

Facilities	Numbers
Upazila Health Complex	495
Peripheral lab at Sub centers	500

[9] In sites with X-pert facilities, all suspected cases receive an X-ray, X-ray positive cases will receive X-pert. In other sites (that lack X-rays), all presumptive cases will receive X-pert directly. Presumptive DR TB (9 criteria) referred from other sites will receive X-pert directly.

Public and private medical colleges/specialized medical institutions	103
Chest diseases clinics	44
Chest diseases Hospital	08
PPM/ Dhaka Urban to cover 12 million population	50
PPM/ Chattogram Urban	20
Sylhet city corporation+ tea garden	10
Narayanganj city corporation	5
Gazipur city corporation	5
Barishal city corporation	3
Khulna city corporation	4
Rajshahi City corporation	4
Cumilla city corporation	3
Mymensingh city corporation	3
Rangpur city corporation	3
Total	**1,260**

- **Introduction of a policy of testing all new sputum-smear positive (SS+) and sputum-smear negative (SS-) patients with Xpert**

Testing all new SS+ and SS- patients with Xpert will lead to an increased detection of primary MDR TB and reduce the transmission of MDR TB in the community. The policy will be introduced through the revision of national guidelines and training materials.

- **Increase child MDR-TB case detection**

This strategy will ensure intensified contact tracing of all MDR cases in their home and in the neighborhood. Specific training among pediatricians focusing on child MDR TB will be conducted. The policy may be revised after the results of the second nationwide drug-resistant survey are available considering the proportion of child MDR-TB cases.

- **Introduction of a fully oral MDR-TB treatment regimen**

The NTP has updated the RR/MDR TB regimens for Bangladesh based on the recommendations in WHO's 2019 DR-TB guideline[10], which include recommendations for the use of fully oral longer regimens. In 2018, WHO convened a GDG (Guideline Development Group) meeting and assessed the individual contribution to treatment outcomes of medicines used in MDR TB regimens using primarily the estimates of effects from 2018 individual patient data meta-analysis. Following a thorough assessment of relative benefits to harms, recommendations were made for each medicine and published in revised guidelines on drug-resistant tuberculosis treatment in early 2019. Drugs were classified in to three groups:

Group A: Fluoroquinolones (Levofloxacin and Moxifloxacin), Bedaquiline and Linezolid were considered highly effective and strongly recommended to be included in all regimens unless contraindicated;

Group B: Clofazimine and Cycloserine or Terizidone were conditionally recommended as agents of second choice;

[10] WHO consolidated guidelines on drug-resistant tuberculosis treatment, WHO/CDS/TB/2019.3

Group C: included all other medicines that can be used when a regimen cannot be composed with Group A and B agents.

The composition of the NTPs oral DR-TB regimens will be guided by the selection of individual medicines considered to be effective and also by a need to combine sufficient medicines to maximize the likelihood of relapse-free cure without increasing toxicity. The NTP plans to use the fully oral regimens for 100% for MDR-TB patients by 2020. In December 2019, WHO released another rapid communication recommending full oral shorter MDR TB regimen replacing Amikacin with Bedaquline. WHO also recommended BPal regimen for the XDR TB patients under operational research conditions. NTP will complete training of the DR TB treatment initiation centers and introduce full oral shorter MDR TB regimen by 2020.

- **Ensure fully functional RTRLs**

Among the Regional Reference Laboratories, Chittagong RTRL has solid and liquid culture/DST facility but no LPA, Khulna RTRL has only a culture facility (DST capacity not yet established), and Rajshahi does not have a solid culture facility, only a special type of C/S called slide culture. This strategy will ensure that all RTRL offer the full range of diagnostic services, including solid and liquid culture, 1st/2nd line LPA and DST. Liquid culture and extended DST for new drugs will be gradually scaled up to all RTRLs. All the RTRLs will be equipped with LPA facility for both first- and second-line drugs. All the RR TB patients will be tested with LPA or second line drugs before treatment initiation to exclude FQ and SLI resistance. All the previously treated TB cases will be tested by LPA for first line drugs to identify Isoniazid mono- and poly-resistance.

Logistics for the distribution of second line drugs have special requirements, such as temperature-controlled drug storage facilities. Under this activity, the establishment of an interrupted transport chain with adequate storage facilities at all levels will be ensured.

- **Provide treatment for all detected XDR TB cases**

The NTP will ensure the treatment of all detected XDR TB cases. For planning purposes, NTP has estimated 10 XDR TB cases to be treated by 2025. Operational research of BPaL regimen to treat XDR TB cases will be considered after discussion with relevant stakeholders.

- **Provide palliative care for patients without further treatment options**

The NTP will ensure the provision of palliative care as well as social support for all patients who do not respond to either the MDR TB or XDR TB treatment regimen. For planning purposes, the number of such cases is assumed not to increase to 50 patients by 2025.

- **Standardized hospitalization and social support policies for MDR–TB patients and incentive package for MDR–TB DOT Providers across all sites in the country**

Standardized hospitalization for one month is one the key components in Bangladesh. After proper facility assessments, further decentralization will be done at least up to district level in a phased manner. Duration of hospital stays will be reduced and Zero-day ambulatory treatment will be considered for patients who are unable to stay in hospital but only after linking the patients with nearby DR TB treatment initiation centers. Social support mechanisms for MDR-TB patients in the form of nutritional support, reimbursement of investigation costs and travel allowances during follow up, as well as monthly financial incentives for MDR-TB DOT providers have been very effective in ensuring treatment

success. Under this strategy, successful models of patient support and incentives for treatment supporters will be continued.

- **Ensure adequate infection control for staff involved in MDR-TB activities**

Infection control measures are described in the recently published guideline "National Guidelines for Tuberculosis Infection Control" Bangladesh USAID 2011 and will continue to be implemented during the expansion of the programme. All health care providers will periodically be screened and be provided with personal N-95 masks, as a protective measure. Clinics and hospitals will be reviewed on a case-by-case basis and an infection control plan will be developed and implemented at each facility.

- **Ensure active drug safety monitoring (aDSM) under MDR TB management**

aDSM has three components- identifying adverse events, management of adverse and events and reporting, where the first two components are well established and reporting the system needs to be strengthened. All the treatment initiation centers are equipped with ECG and audiometry. However, after transition to full oral MDR TB regimen the role of audiometry will be limited. Other baseline and follow up monitoring investigations are done according to National PMDT guidelines. Initially patients do the test and money is reimbursed based on actual expenses. Patients with adverse events are managed in the primary health care facility or referred to higher centers. Provision of ancillary medicines is provided at no cost to all MDR-TB patients through government funds. The reporting is still paper based which need to become electronic. Enhance improvements in monitoring of smears, cultures and investigations while the patient is on treatment. The e-TB Manager could be used for this purpose. Provision of home-based care, counseling & support services by involving local/grass-root level NGO/CBO partners is in place. However, community engagement will be strengthened further by inclusion of affected community and by forming patient support group.

7.1.2.2 Ensure continuous supply of TB drugs and diagnostics

Previously, all TB medicines were funded through the Global Fund Grant but in 2017/2018, the GoB took full responsibility for funding first-line TB medicines as well as ancillary medicines and recently increased its budgetary allocation for anti-TB medicines following an increase in the number of notified TB cases. Second-line TB medicines are however, still funded through the Global Fund Grant. Tuberculosis medicines are mostly sourced through the Global Drug Facility (GDF) to ensure quality medicines are obtained for the citizens of Bangladesh. The staff responsible for managing the in-country TB medicine supply chain are pooled from the government, funders, including the Global Fund and non-governmental agencies. In public health facilities, the cadre of health care workers responsible for managing medicine stores are mostly Storekeepers while other cadres may be utilized by implementing partners supporting the public health care system to deliver TB services in the areas they have been assigned to. Available tools for the Logistics Management Information System (LMIS) include vouchers, bin cards and registers for recoding and reporting products storage and movement. The LMIS is largely paper based. These tools could be used in tracking the movement of goods from the Central Warehouse (CHW) to the end-user although not with specifics on batches and expiry dates but in terms of quantities. An electronic LMIS tool, Warehouse Inventory Management System (WIMS) is in use at the CWH and is being piloted in three of the 64 districts.

Gaps related to the TB Procurement and Supply Chain Management System

- Even though the government is providing funds for the procurement of first-line TB medicines, the allocation is not yet sufficient to provide adequate buffer in the supply system. Administrative processes are hampering the release of funds in the time needed for the commencement and completion of procurement processes to avoid disruptions in the availability of these medicines.
- Tuberculosis medicines can be obtained outside the NTP and use of levofloxacin in the community has been reported as it can be easily procured from the private sector. Some medical officers in public health facilities still make prescriptions using branded TB medicines available in the private sector. aDSM is largely not yet in place even though the new TB medicines (BDQ, DLM) are already being used in the country. Clinicians working in the NTP network report low rate of adverse drug reactions.
- It was observed that storekeepers at public medicine stores have no store assistants and it was reported that over 50% of the staff engaged in the in-country TB medicine supply chain are due for retirement within the year. This poses a risk to the supply chain system if not immediately addressed. Often the severe shortage of human resources for health (HRH) has led partners to provide support to fill in the gaps which raises questions of the long-term sustainability of these support mechanisms and can lead to inadequate effort to build public sector capacity for a strong and secure procurement and supply chain management system.
- Since the reporting system is primarily a paper-based system, it is somewhat difficult to have an end-to-end visibility of the supply chain and also difficult to analyze logistics data for decision making. There is no systematic way of collecting patient's data per regimen for the quantification and early warning system (EWS) especially for the second-line TB medicines. However, these data set are available at the facilities and some form of consumption data (issue-to-user) is available at MDR-TB centres.

The central logistics team seem not to have a strong leadership role in the management of supply chain issues at lower levels. There are little or no forum for meetings and reviews and capacity building activities. The central logistics staff do not have regular supervision to district and Upazila levels to understand and strengthen the system. Also, the staff at the district level do not carry out supervision to the storage points they oversee hence have little or no knowledge about the practices at these health facilities.

Activities to address these gaps

- Establish effective and efficient systems for transportation/distribution of TB Drugs and supplies from store/s to facilities

The objective is to improve current distribution and transportation system and establish a model which is more cost effective, delivers higher quality while maintaining the efficiency of lead time.

- Developing SOP and framework for distribution of TB drugs and supplies

- Building a supply team (recruitment as required)
- Long term contract out for fleet management
- Route plan, records and reports of distribution,
- Ensure maintenance of optimum temperature and other quality parameters during the transportation in order to avoid degradation of efficacy/quality of medicines and other supplies
- Setting up and monitoring performance indicators

- Ensure the uninterrupted supply of quality-controlled drugs at all facilities

The uninterrupted supply of quality-controlled drugs to all facilities is a key requirement for treatment success. This strategy seeks to address current deficiencies in the current drug management system by strengthening inventory management, ensuring adequate usage of the recently introduced Quarterly TB Drug Report, scaling up implementation of the drug management module of the e-TB Manager, improving quantification for future procurements and introduction of bar code labeling for all drugs for improved inventory management.

- **Ensure pharmacovigilance through regular drug quality control**

Under this strategy, the NTP will ensure that regular drug control activities for all newly procured first- and second-line TB drugs will be effectively implemented countrywide.

- **Encourage local pharmaceuticals to produce first line TB drugs**
  Encourage local manufacturers through support from CMSD/partners to include prequalification or stringent regulatory standard for domestic production and procurement of First Line TB Drugs (FLDs)
    - Hold consultative workshop in coordination with relevant stakeholders
    - Follow up on progress at a regular interval

Capacity building on PSM both in core PSM personnel as well as other related (especially at field level).

To improve capacity and leadership role of the central logistics team in the management of logistics/supply chain issues at lower levels and to mitigate gaps in knowledge, skills, practice of the field staff involved in logistics/supply management (store keepers, TLCA, PO), capacity building interventions like training and supportive supervision will certainly play an important role.

- Capacity building on supply and distribution (on the job training as regular activities)
- Capacity building of the DGHS/NTP personnel on quantification, forecasting, early warning system and other priority PSM issues.
- Capacity building of DGHS recruited Storekeeper at different level on key supply and storage functions related to TB drugs, lab consumables and supplies.

7.1.2.3 Increase capacity of public facilities (including CDHs & CDCs) for all forms of TB treatment & follow-up

Achieving effective TB control requires concerted efforts at all levels. The Bangladesh Health Facility Survey 2014 collected data on several key measures of the preparedness of facilities that offer TB diagnosis and treatment services to provide those services. The survey found that only 10 percent (18 percent excluding community clinics (CCs)) of health facilities offer some form of TB services, e.g., TB diagnosis, treatment, or treatment follow-up services.

A large proportion of DHs (94 percent) and UHCs (93 percent) offer TB services. In contrast, only five percent of USCs/RDs and CCs do so. Six out of 10 private hospitals and two out of 10 NGO facilities provide TB diagnosis, treatment, and/or TB treatment follow-up services. The TB treatment and/or TB treatment follow-up services are much more likely to be available in UHCs (86 percent) and DHs (63 percent) than in other types of facilities. Five percent or less of other public facilities, six percent of private hospitals, and 12 percent of NGO facilities provide these services.

More than a quarter of urban health facilities offer TB treatment and/or TB treatment follow-up services, whereas the availability is very low in rural facilities (three percent). Divisional differences in the availability of TB treatment and/TB treatment follow-up services are generally small.

Gaps in the readiness of the facilities

• Among facilities that offer TB services, 43 percent have TB guidelines available.

• Only 13 percent of facilities that offer TB services have TB rapid diagnostic test kits, and only 5 percent have culture medium for diagnosing TB.

• One-third of facilities that offer TB services have first-line medicines for treating TB. Less than half of the facilities have at least one provider who ever received in-service training related to TB.

• Based on WHO criteria, only 26 percent of DHs, 21 percent of UHCs, and 15 percent of NGOs that offer any TB services are considered ready to provide TB services.

- No private hospitals were considered ready to provide TB services

    - **Ensure the availability of functioning X-ray facilities at all CDCs and CDHs**

The new diagnostic algorithm includes a much broader use of initial chest X-ray examination for all suspects. Under this strategy, the availability of functioning X-ray facilities at all CDCs and CDHs will be ensured through the procurement of new digital X-ray machines, or the repair/maintenance of existing machines where feasible.

    - **Repair, maintenance and procurement of IT, diagnostic and other fixed assets/equipment**

To expand the accessibility of the service and ensure continuity by keeping the tools functional, procurement and repair/maintenance would be a pre-requisite.

        · In coordination with relevant departments in NTP, prepare procurement plans and eventually execute those procurement functions. Considerations on life

cycle, issues with warranty, servicing and repair/maintenance are important factors.

- Capacity building of relevant personnel on asset management

7.1.2.4 Prevent the loss of TB cases in the cascade of care with support systems

The United Nations Secretary General's Special Envoy on TB has called for more widespread use of care cascade analyses to help achieve the End TB strategy. The concept of care cascades has only recently been used to evaluate TB care, although some studies suggested that TB programs have a tradition of conducting cohort analyses and, more recently, of using patient pathways analyses to understand dropouts in care. The WHO has outlined an onion model in which patient losses across different steps in care are visualized as a series of concentric circles and this conceptual model informs our approach to the care cascade.

Gaps related to cascade care

The NTP plans to introduce the care cascade monitoring as a management priority of the NSP 2021-2025. This is an area where the NTP has not worked intensely. As part of strengthening the monitoring system, NTP plans to work on the care cascade monitoring.

Activities to address these gaps

Following activities for ensuring care cascade monitoring for enhanced outcomes include the following:

- Incorporation of local care cascade information into the district plans
  - Identification of active groups/local structures in the community for supporting the care cascade.
  - ii. Uptake of available NTP partnership options.
  - iii. Collaboration with ongoing public health programs (leprosy, HIV etc) in the district for TB advocacy, care and management and subsequent rehabilitation of TB patients.
  - All stakeholders participating in the care cascade to be notified on eTB manager platform for direct benefit transfers, monitoring and notification of TB patients.
- Sensitization of the civil surgeons on the need to budget supplementary activities required for care cascade support. These include administrative and health functionaries at all levels.
- Regular monitoring to be undertaken through review meetings and onsite checklists at district and division level. Incorporation of "Care Cascade Check" indicators in the program management reports.
- Trainings of program staff, partners, and volunteers on the reporting formats used for monitoring the care cascade.
- Patient feedback of service provided will be taken through the helpline "Call centre" support. The information obtained will be shared with individual treatment supporter via e- TB manager for remedial actions, if any.
- All the required logistics and coordination required for quality uptake of the patient Care Cascade will be provided by the District under supervision of the NTP.
- Empower patients with information and support structures to initiate and sustain treatment

- Sensitization of communities through ACSM
- Each patient notified under the e-TB manager platform starting from diagnosis, need to be enrolled for ICT enabled treatment adherence support and direct benefit transfers as per norms.
- Patient support services where applicable will be linked with individual patient registry in e-TB manager. Once the patient gets diagnosed by a public or private partner, the patient gets registered in e-TB manager. Treatment information is further updated regarding the regimens, dosages, adherence mechanism and benefit schemes chosen. Accordingly, timely alerts and feedback mechanism will get initiated through e-TB manager.
- Through the e-TB manager platform, automated reminders on treatment initiation, interruption and follow up will be sent to treatment provider and patients. In addition, SMS support services will also be made available for awareness, counselling and reminder alerts.
- An offline app for patient education will be available for free download. Information regarding TB diagnostic and treatment services, enablers, grievance through call center support will be linked on the app through e-TB manager.
- Nutritional support/enabler honorarium where applicable linked to continuation on treatment through e-TB manager.
- Several innovative models of involvement of patient support groups in rural areas has been found to be successful in providing a holistic approach to TB care. Such models will be replicated based on the availability of applicable norms

- Expanding options for treatment adherence monitoring

  Introduce and test technology-based solutions to expand the options of adherence monitoring and benefit transfer.

Developing and implementing simple systematic relapse surveillance is considered, with at least phone calls being made to patient cohorts at 6 and 12 months to ascertain if relapse has occurred. This will particularly be important as a monitoring tool during regimens transition in the programme. This will also address the missing millions and decrease the initial loss to follow up. A major shift proposed is to initiate every TB patient on treatment at the site of diagnosis.

7.1.3 COLLABORATIVE TUBERCULOSIS/HIV ACTIVITIES; AND MANAGEMENT OF COMORBIDITIES

Bangladesh has a concentrated epidemic with a very low HIV prevalence rate which has been attributed to robust prevention efforts by the government[12]. Despite this, the number of people living with HIV has increased steadily beginning in around 2000 (Figure 10).

Gaps in co-morbid conditions:

i. TB and HIV co-infection

HIV testing is not routinely done for TB patients; hence the proportion of TB patients tested for HIV and the HIV co-infection are not well recorded. The latest coverage of HIV testing in Bangladesh, only about 1.0% (2,685 TB patients) of notified TB patients were tested. Out of which, only 0.3% (Eight cases) had TB/HIV co-morbidity conditions. Whereas, the number of TB patients diagnosed between 2014-2018 among PLHIV is steadily increased from 6.3% to 21.7% in 2014 to 2018 respectively, the data is inconsistent. The increase may be due to an increase in TB screening among PLHIV.

ii. Underweight-Malnutrition

Being underweight is of one of the risk factors for developing TB. The underweight marker is (<18kg/m2) for underweight adults. Overall, for both sexes, there is a decline of the proportion of under-weight adults since 2010. However, females have a higher proportion compared to males, and much higher compared to the national average. Addressing malnutrition through GO/NGO sponsored patient support systems like nutritional rehabilitation schemes could help to reduce the number of individuals who are at risk of developing TB. NTP Collaboration with the National Nutrition Program and integration with existing nutrition programs at respective areas where available (MAF – TB Beyond NTP) is therefore warranted.

iii. Smoking

Smoking is another determinant of developing TB among individuals with tuberculous infection. The trend of smoking is steadily going down from 2000 to the projected estimates of TB prevalence in 2025. The prevalence is at around 45% in 2019 among males which is high and may contribute to the TB epidemic in Bangladesh. NTP has recognized smoking as a problem and has established smoking control interventions for the general population which is commendable and encouraged to strengthen TB -Tobacco collaborative efforts. The NTP Collaboration with the National Tobacco Control Initiative and integration with the existing tobacco control initiative, (MAF – TB Beyond NTP), is therefore warranted.

iv. Diabetes Mellitus

Diabetes is an associated risk factor for active TB. In Bangladesh in 2015, the prevalence of diabetes in the population ages 20 to 79 was 8.3%. A professional association on diabetes has initiated a program to screen diabetes patients for TB. Of 15,180 Diabetes patients identified as suspected TB cases, 11,715 (77%) were referred for sputum microscopy. Of these 1,074 (9 %) were identified as sputum positive pulmonary cases. Another 311 were clinically diagnosed pulmonary TB cases and a further 207 were diagnosed as EPTB cases.

Activities to address the gaps

- Ensure full implementation of WHO's TB-HIV policy

HIV testing in the 23 high -burden districts will be done for all TB patients and in other districts only for the high-risk population. The plan to increase from the present 1.0% (2,685 TB patients) of notified TB patients to 30% by 2021 and 100% by 2025.

Under this strategy, the full package of WHO's TB-HIV strategy as reflected in the national TB/HIV guideline 2nd edition will be implemented, including stronger TB/HIV collaboration between the NTP and NASP with coordinated guideline writing and biannual TB/HIV collaborative meetings; HIV screening for all newly-diagnosed TB cases; introduction of "provider initiated HIV testing" for DOTS clinics, hospitals, and areas with high number of TB patients with HIV risk; the screening of all HIV patients for symptoms of TB, the diagnosis of HIV-positive symptomatic on the basis of gene Xpert, and the provision of IPT to all HIV-positive contacts of TB cases.

The strategy also includes" (a) an increased awareness building programme for TB at community level, (b) a sensitization program for service providers under priority districts to ensure proper referral and to maintain confidentiality of TB-HIV patients, (c) orientation on TB-HIV co infection issues among the caregivers of HIV patients, (d) group education session with PLHIV on TB-HIV Co infection, (e) Local Level Advocacy (LLA) at community level to reduce stigma and discrimination as well as to promote socio-cultural environment and community support towards the TB patients, and (f) National Level Advocacy with Policy makers for the integration of TB-HIV patients under social safety net program. In addition, a survey for HIV sero-prevalence of TB patients will be performed.

- Malnourished populations, especially children

Under this strategy, clinics and outreach (satellite clinic) efforts that screen for and monitor malnutrition will receive training to include TB screening and referral activities. Also, TB screening and referral activities will be integrated into Bangladesh's highly successful IMCI program, providing an important opportunity to identify childhood TB cases through existing, well-established mechanisms.

- Smoking

Smoking substantially increases the risk of TB more than two-and-a-half times and death from TB. Bangladesh is one of 14 countries in the world facing the heavy burden of tobacco epidemic. Since 2011, BRAC has been implementing tobacco cessation programs in urban TB control service facilities in Dhaka to strengthen the intervention and cover more beneficiaries. The coverage of BRAC's TB Control Programme has been extended to Chittagong, Sylhet, Barisal, Khulna, Narayanganj, Gazipur and Rangpur urban areas from January 2016. Under this strategy, program implementation will be further expanded to achieve countrywide coverage.

- Elderly

The recent prevalence survey consistently showed a higher prevalence of TB among the elderly. This strategy will address this specific epidemiological situation through the development of policies to increase passive and active case finding among this group, such as ensuring contact tracing, conducting FAST activities in hospital out-patient departments and high-risk congregate setting, and conducting X-ray screening activities in congregate settings. In addition, community-based approaches and social mobilization to case finding among the elderly will be implemented.

- Other key affected populations (KAP)

To further increase case detection among other key affected populations (KAP), the NTP will involve representatives of KAP in planning, policy making and implementation of the TB programme. The strategy will ensure the effective utilization of self-help groups for screening of presumptive cases and for DOT as well as a patient friendly environment for KAP in DOTS centres. All presumptive TB cases among KAPs will be tested for HIV. There will be regular orientation for service providers of TB programmes to provide specific and need based services to KAP population. Flexible office hours to avail TB services for KAP will be introduced. The strategy also includes special outreach activities for KAP in their service centres, as well as basic and refresher training for self-help group members on TB. National Level Advocacy with Policy makers for the integration of TB patients of KAP community under the social safety net programme will be introduced.

- Improve the management of TB cases with co-morbidities including diabetes

Co-morbidities such as diabetes present special challenges in the care for TB patients. The association between DM and TB and their synergistic role in causing human disease has been recognized for centuries. In Asia, the prevalence of DM is increasing at a dramatic rate, particularly India, China and Bangladesh. Persons with diabetes have a significantly increased risk of active TB, which is two to three times higher than in persons without diabetes. There is growing evidence that DM is an important risk factor for TB and might affect disease presentation and treatment response. The effect of diabetes on the development and severity of TB, and the complex interrelations between nutrition, obesity, diabetes, and tuberculosis remain provocative issues in public health and clinical medicine. Recent studies have also reflected increasing concern among field workers in TB facilities, that DM may be a major potency in converting latent infection into overt disease. Thus, the link between DM and TB has occupied the center stage of discussion. With almost eight per cent of diabetes death occuring in low- and middle-income countries, around seven million people of Bangladesh have been suffering from diabetes as the number of such patients is rising by 5-6 percent each year. In the setting of the increasing overlap of populations at risk for both diseases, the combination of TB and DM represents a health threat for Bangladesh.

This national strategy consists of a comprehensive multi-component approach to increase access to TB services for DM patients by improving prevention, early case detection and quality of care for persons with diabetes and TB, thereby contributing to reduction in the mortality and morbidity rates in persons with TB-DM co-morbidity. These interventions will

bring significant and rapid improvement in TB-DM co-morbidity control and prevention activities in Bangladesh. The strategy will be implemented through the execution of multiple tasks including: 1) Improve the early detection of TB in persons with diabetes 2) Strengthen provider capacity in diabetes-TB diagnosis & case management and Increase patients' and community awareness about TB-DM co-morbidity through a public private mixed approach.

7.1.4 PREVENTIVE TREATMENT OF PERSONS AT HIGH RISK; AND VACCINATION AGAINST TUBERCULOSIS

The main health care intervention available to reduce the risk of a latent TB infection progressing to active TB disease is TB preventive treatment. WHO guidance issued in 2018 recommends TB preventive treatment for PLHIV, household contacts of bacteriologically confirmed pulmonary TB cases and clinical risk groups (e.g. those receiving dialysis). The breakdown of the target to reach 30 million people with TB preventive treatment in the 5-year period 2018–2022 set at the UN high-level meeting (UNHLM) on TB was 6 million PLHIV and 24 million household contacts (4 million children aged under 5 years, and 20 million other household contacts). The NTP targets are in line with the UNHLM targets and the recently published South-East Asia Regional Action Plan on Programmatic Management of Latent Tuberculosis Infection[11].

GAPS RELATED TO TUBERCULOSIS PREVENTIVE TREATMENT

The NTP and the National AIDS Control Program (NACP) currently provide TPT to eligible children under 5 years of age and PLHIVs, however, coverage of TPT among child household contacts under 5 years was less than 5% in 2017 (Global TB Report-2018). Other vulnerable and at-risk populations recommended to receive TPT by WHO are not targeted for systematic screening and TPT under the NTP. Contact investigation recording and reporting tools are available at health facilities, however, recording and reporting remains incomplete with sub-optimal monitoring. A feasibility study on the shorter rifamycin based regimen of three months weekly isoniazid and rifapentine (3HP) was recently conducted among household contacts of index case aged more than two years under the Challenge-TB project funded by USAID at 12 DOTS Centers in urban Dhaka. A total of 1,216 individuals were initiated on TPT, 97% of them completed the treatment successfully with 5% of them reported to have experienced minor adverse drug reactions during the course of TPT. Other shorter regimens like 3HR and 4R have not been piloted in the country. Implementation of activities to promote TPT in both the public and private sector is very minimal in the country. Contact investigation and community outreach is done by NGO partners (BRAC, DF, IRD Bangladesh etc.) with the involvement of community health assistants, however, TPT implementation as part of these efforts was observed to be suboptimal in the centers visited.

The following gaps related to tuberculosis preventive therapy have been identified:

- Updated and consolidated guidelines on LTBI Management were published by WHO in 2018 and recommended systematic screening, testing and treatment of latently TB

[11] South-East Asia Regional Action Plan on Programmatic Management of Latent Tuberculosis Infection. New Delhi: World Health Organization, Regional Office for South-East Asia;2018

infected individuals on a priority basis in all TB high burden countries. These recommendations have not yet been fully implemented by the NTP. Bangladesh being a high burden country should develop and roll out "TB Preventive Treatment" on a programmatic mode for targeted populations at the earliest in order to achieve the End TB strategy goals and in line with commitments by GoB made at the TB-UNHLM held in New York in September 2018.

Activities to address these gaps

- **Implement a comprehensive infection control policy at all implementation sites**

The NTP has developed a comprehensive infection control policy, but implementation at peripheral facilities has been limited. Under this strategy, the implementation of infection control at all treatment facilities will be ensured through reconstitution of the multidisciplinary team on TB IC policies and guidelines, and inclusion of their oversight in the scaling-up of TB IC; development and implementation of a program for pre-service and in-services TB screening, including routine surveillance among HCW and laboratory staff; definition of a set of SOPs for waste management for each level of care; training of Master Trainers and managers responsible for regular supervision and M&E on technical and programmatic aspects of TB IC.

- **Countrywide implementation of a strategy for treatment of latent tuberculosis infection (LTBI)**

Latent tuberculosis infection (LTBI) is defined as a state of persistent immune response to stimulation by Mycobacterium tuberculosis antigens with no evidence of clinically manifest active TB. There is no gold standard test for LTBI. The NTP strategy considers the probability of progression to active TB disease in a specific risk group, the epidemiology and burden of TB, the availability of resources and the likelihood of a broad public health impact, based on recommendations published in recently updated WHO guidelines on LTBI.

- **At-risk populations that should receive LTBI treatment**

Based on recommendations published in the recently updated WHO guidelines on LTBI, the NTP considers the following populations to be at-risk populations that should receive LTBI treatment:

A. Adults, adolescents, children and infants living with HIV

· Adults and adolescents living with HIV who are unlikely to have active TB should receive preventive treatment of TB as part of a comprehensive package of HIV care. Treatment should be given to these individuals irrespective of the degree of immunosuppression and also to those on antiretroviral treatment (ART), those who have previously been treated for TB and pregnant women.

· Infants aged < 12 months living with HIV who are in contact with a case of TB and are investigated for TB should receive preventive treatment of TB if the investigation shows no TB disease.

· Children aged ≥ 12 months living with HIV who are considered unlikely to have TB disease on the basis of screening for symptoms and who have no contact with a case

of TB should be offered preventive treatment of TB as part of a comprehensive package of HIV prevention and care.

B. HIV-negative household contacts

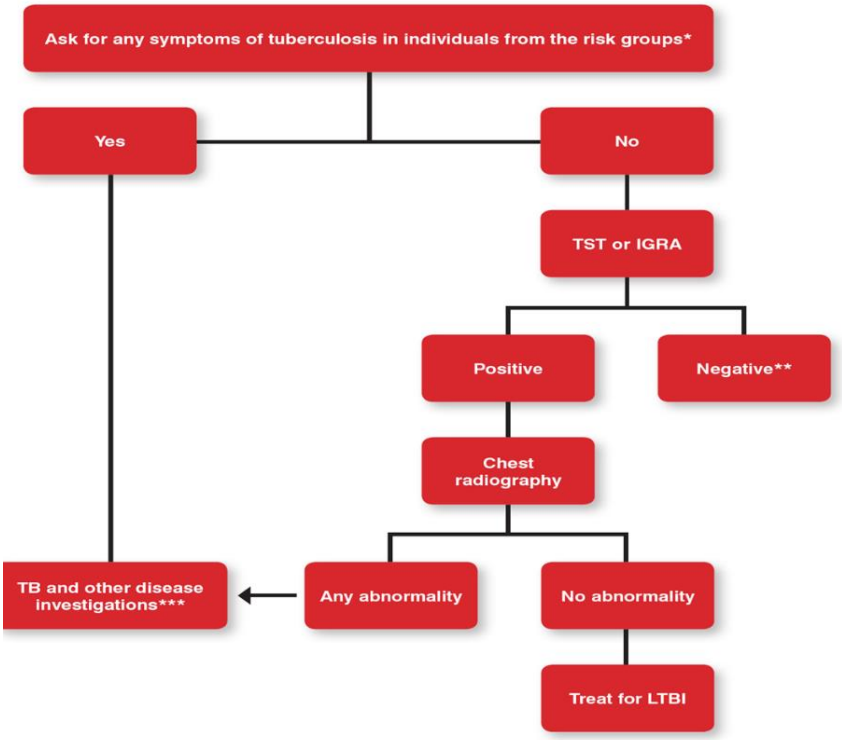
· HIV-negative children aged < 5 years who are household contacts of people with bacteriologically confirmed pulmonary TB and who are found not to have active TB on clinical evaluation should be given TB preventive treatment.

· Children aged ≥ 5 years, adolescents and adults who are household contacts of people with bacteriologically confirmed pulmonary TB who are found not to have active TB by clinical evaluation may be given TB preventive treatment.

· **Screening algorithm**

The NTP will use the following screening algorithm to identify candidates for LTBI treatment:

Figure 18: Algorithm for targeted diagnosis and treatment of LTBI



Any symptoms of TB include any one of: cough, haemoptysis, fever, night sweats, weight loss, chest pain, shortness of breath, fatigue. HIV test could be offered based on national or local guidelines or clinical judgment. Similarly chest radiographs can be done if efforts are intended also for active TB case finding.

* Clients for whom LTBI treatment is not indicated should be provided information about TB including on the importance of seeking care if symptoms of TB developed.

** National TB guidelines should be followed while investigating for TB. In addition, those individuals in whom TB is excluded after investigations (including individuals with fibrotic radiologic lesions) can be considered for LTBI treatment.

- **Drug regimens:**

The following drug regimens will be used for LTBI treatment:

Age Groups	Regimen of Choice	Special Case
< 5 years	6H (180 doses daily)	6H (180 doses, daily) PLHIV
> 5 years	3HP (12 doses-weekly)	

Table 5 Drug regimens for LTBI treatment

- **Development of SOP**

Detailed SOPs for the introduction of LTBI will be developed by the NTP in early 2020.

- **Identification of focal persons in the field to operationalize the LTBI**

This strategy will involve the identification of focal persons for programmatic management of LTBI in the field, capacity development of Focal persons to manage LTBI, and the development of a working group in every treatment centre of LTBI involving GOB and implementing partners.

- **ACSM activities for LTBI management**

This strategy will involve the development of an ACSM plan to raise awareness in the communities on LTBI, involve all public and private doctors for TPT for LTBI, raise awareness among contact persons to bring family members for TB screening, inform contact persons about the benefit of TPT and the requirement of completing TPT, and inform DOT providers of contact persons on LTBI and encourage them to do DOT for TB Preventive Therapy.

- **Follow-up and monitoring activities for LTBI management**

The NTP will ensure the implementation of a comprehensive set of follow-up and monitoring activities. Follow-up activities will include adherence to follow-up by program workforce (GO/NGO), weekly reminder phone calls by assigned GO/NGO staff, use of a symptom checklist and monthly facility-based clinical follow-ups by medical doctors. Monitoring activities will include the establishment of a clinical body for monitoring (national and regional), reporting of adverse events, immediate clinical assessment and further management including a decision to continue or stop ongoing TPT.

The components/objectives that falls under this pillar as follow:

7.2.1 POLITICAL COMMITMENT WITH ADEQUATE RESOURCES FOR TUBERCULOSIS CARE AND PREVENTION

There are still significant health system bottlenecks in Bangladesh, that are hampering the delivery of effective, efficient and equitable TB services. These bottlenecks include gaps in Human Resources for Health (HRH) and in the anti-TB medicine procurement and supply chain management system (PSM).

UN Member States committed to "supporting the development of a multisectoral accountability framework" in advance of the first UN high-level meeting on TB in September 2018, and WHO has meanwhile developed such a framework, working in close cooperation with Member States and partners. The rationale for a multisectoral accountability framework for TB (MAF-TB) is that strengthened accountability for the response to TB at national, regional and global levels should contribute to faster progress towards the TB targets and milestones of the SDGs and WHO's End TB Strategy.

Gaps related to political commitment

Bangladesh was represented at the Moscow Ministerial meeting on TB that was held in November 2017 and was a signatory to the Ministerial Declaration that came out of this meeting in which countries committed to accelerate action to end TB to meet the milestones towards achieving the SDGs. An important outcome of this meeting was the commitment by countries to pursue a multi – sectoral approach with engagement of Government at the highest possible level in the fight against TB. The People's Republic of Bangladesh was also represented at the first ever United Nations General Assembly Meeting on TB (TB-UNHLM) in which a number of commitments were made by Heads of States and Governments to fight TB including the adoption of very ambitious targets such as the identification and treatment of 40 million people with TB disease and the provision of TB preventive therapy to 30 million people with latent TB infection (LTBI) by 2022 and closing the TB financial gap to reach the End TB Strategy and SDGs goals and targets.

The 4th Health, Population and Nutrition Sector Programme (2017-2022), provides a coherent vision for the Health Sector and clearly describes the health priorities. It includes a well thought out essential service package and has defined impact goals. Tuberculosis is included among the 29 operational programmes in the 4th HPNSP.

The following gaps related to health system strengthening, political commitment, governance and coordination have been identified:

i. As a cause of morbidity and mortality, TB leads other infectious diseases in Bangladesh and should be receiving the highest possible level of attention. While some infectious disease such as Dengue fever cause episodic waves of morbidity and mortality, the public health threats of these waves of morbidity and mortality pale when compared with the largely silent but massive epidemic of TB in this country. Even though there is a TB/Leprosy and Aids and Sexual Transmitted Disease Program

(ASP) operational plan in the 4th HPNSP, TB and other communicable diseases are not included among the eight goals of the 4th HPNSP raising concern about the weight that TB is given in the prioritization of health issues in the country. There is also no clarity on the link between the TB- NSP and the TB/Lep/ASP operational plan and budget.

ii. While on paper the 4th HPNSP coordination task groups are well described, not all are active or efficient, and there is no 4th HPNSP task group for TB or communicable diseases.

iii. While the NTP has strong partnerships and collaborates well with large NGOs, involvement of civil society and affected communities appears to be less robust.

iv. Health planning appears to be overly centralized which may negatively impact program ownership at the local level.

v. There is limited evidence that the commitments that were made at the Ministerial Meeting in Moscow in 2017 and at the TB-UNHLM are being pursued. There has been little progress with the recommendation of the 7th JMM to create a multi - sectoral coordination mechanism and limited evidence that a whole government approach to TB care and prevention intended to lead to a robust multi- sectoral approach to the fight against TB is in place.

Activities to address these gaps

- **Financing and Resources Mobilization**

Major funding sources are GOB through the MOH budget, the Global Fund and USAID. In addition, several NGOs provide direct funding for specific projects. Proportionally, the largest funding amount for implementation of the NSP 2021-2025 is provided through the GF New Funding Model (NFM) grant, which included a substantial incentive amount ("above allocation funding") to ensure the achievement of NSP targets. The current grant will expire by the end of 2020, but funding for a new project covering the period 2021-2023 has recently been approved, with further increased funding amounts. USAID has maintained its financial support to the NTP through various projects.

By the end of 2019, The Global Fund confirmed that funding for the NTP will be continued after 2020 at levels similar to those during the previous funding period. The envelope of funding available for the country, and the proposed disease split for TB indicates that US$ 111.7 million will be available for TB activities during 2021-2023. In addition, US$ 10.05 million 'catalytic funding' will be available for activities to further increase TB case detection. Catalytic funding will need 'match-funding', possibly from the GOB or from other funding sources. The budget of the 2021 -2023 TB – NSP is given as USD 553.27 million with 34% indicated as the financial gap within allocation period 2021- 2023. That translates into a financial gapis USD 186 million with the GoB contributing a total of USD 166.4 million.

The 4th HPNSP provides a clear budget framework for both revenue (recurrent) and development budgets. National Health Accounts are improving and there is greater attention paid to public financial management. The country is advancing Universal Health Coverage and is piloting UHC in one district. There is high level political commitment to UHC with on-going high-level dialogue at the Prime Minister level and with interest of development partners in financing health services to strengthen the health system. The GoB came through with its commitment to procure first line anti-TB medicines in 2018 effectively

shifting this responsibility from the Global Fund to self. Primarily the Global Fund and USAID in partial, who have been the main sources of external financing for the TB response in Bangladesh, have ongoing commitments to fund TB.

There are many ways to increase additional domestic funding for health and TB, however, taxes remain the most important channel. With a fairly robust economic growth, Bangladesh is continuing additional efforts to raise the tax-GDP ratio so that the financial resource envelope can be expanded.

In partnership with other stakeholders, NTP is developing a robust and ambitious TB- NSP 2021-2025 which is carefully costed, so that the TB-NSP can become the primary advocacy tool (the investment case) for mobilizing financial resources for the TB response. A mechanism is proposed to track the exact financial envelope available and the gaps, taking into account the need to scale-up interventions and tools such as active TB case finding, access to the chest x-ray, roll-out of more sensitive TB diagnostic tests, use of new drugs and preventive treatment so that a very high population coverage for essential TB screening, testing, care and treatment services is achieved. In addition, the MoHFW/NTP needs to recognize that additional resources will be required to scale up and achieve high level coverage of engagement of the private sector where the majority of TB patients first seek care when they fall ill and to enhance the quality of care provided by these providers. By engaging a high proportion of private health care providers in the TB response, the MoHFW/NTP will also be alleviating out of pocket expenditure by TB patients and their families. The B-JMM also advises the MoHFW to immediately seek recourse to reduce administrative bottlenecks likely to impede the procurement of anti-TB medicines to avoid stock outs.

NTP will explore opportunities for additional financing from domestic sources including through Public Private Partnerships (PPP). A wide range of initiatives involving the private sector will be initiated and will explore sustainable mechanisms for raising additional domestic resources for TB care and prevention. These include corporate sector engagement that goes beyond TB service provision by these entities to, for example, large scale corporate social responsibility (CSR) programs.

NTP will continue Development Partner (DP) engagement so that financing from external sources does not decrease but further expands, even if proportionately financing of the TB response by external sources decreases as financing from domestic sources increases.

The MoHFW/NTP will continue urge to recognize that the financial needs of the program are likely to expand overall as the effort to end TB as a public health threat by 2030 is enhanced. In collaboration with other government ministries such as planning and finance, local NGOs and international partners, NTP will pursue and sustain the advocacy efforts and fruitful engagements with external funding agencies to expand the resource envelope available to meet the increasing needs of the program and to support the continued implementation of high output activities for TB care and prevention in Bangladesh. The 8th B-JMM recommended that the NTP Bangladesh, development partners and other agencies be better harmonized and work in tandem with each other and with the GoB to ensure that additional resources become available for TB care and prevention and that they are put to the best use to meet the critical TB needs of the country.

- Ensure quality implementation of all NTP activities through establishment of a multisectoral accountability framework for TB (MAF-TB)

- In Bangladesh, achievement in the Health Sector do not solely result from MOHFW's success; the other sectors like information, education, social welfare and agriculture etc. also contribute enormously. Therefore in 4th HPNSP, MOHFW aim to work closely with others sector to achieve the HNP related SDG Targets. For TB, to address the issues that affect access to health care, impact nutritional status, health related catastrophic cost, to overcome social barrier and stigma related TB, concerned effort and actions across the multiple sector will be taken.

a) Government of Bangladesh is such committed to achieve the global commitment and in light with this NSP 2021-2025 prioritizing focus for establishing a multisectoral accountability framework for TB by engaging high level ministry, WHO and other development partners and affected community. This will be a customized framework for Bangladesh in collaboration with WHO.

b) The rationale for a multisectoral accountability framework for TB (MAF-TB) is that strengthened accountability for the response to TB at national, regional and global levels should contribute to faster progress towards the TB targets and milestones of the SDGs and WHO's End TB Strategy. The NTP Bangladesh is committed to introducing the multisectoral accountability framework, based on the following concepts:

- *Accountability* means being responsible and answerable for commitments made or actions taken.
- A *framework* provides an overview and structure of essential components and subcomponents, and the relationships between them. A framework can be adapted; for example, by modifying, adding or deleting items, and by adding detail to subcomponents to customize or give them greater specificity.
- An *accountability framework* needs to define who is accountable (e.g. individuals, organizations), what commitments and actions they are accountable for, and how they will be held to account. Mechanisms for monitoring and reporting, as well as review, are critical in holding entities to account. The essential components of the accountability framework (commitments, actions, monitoring and reporting, and review), and how they are related, are shown in the figure below:

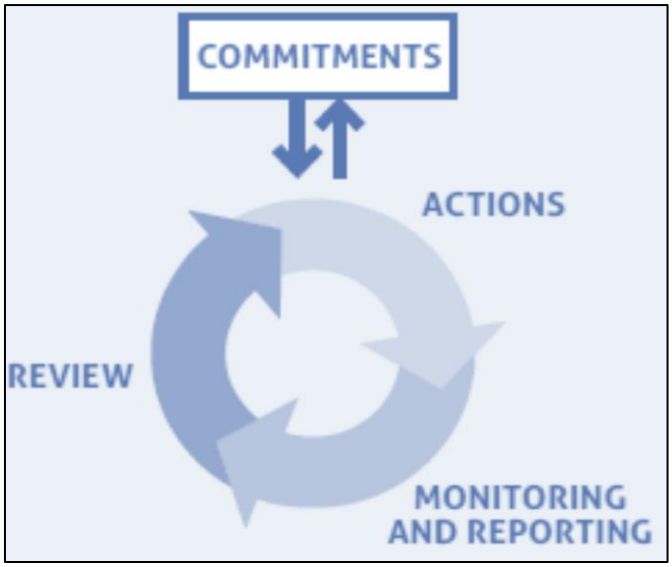


Figure 19 Multisectoral accountability framework

- In the context of health, *multisectoral* is usually used to refer to sectors of the economy (and related parts of government) that influence health, and which need to be engaged by the health sector to address health issues. A multisectoral accountability framework needs to include content related to multiple sectors. The following specific activities for establishment of the multisectoral accountability framework are planned and described below.
- Sustained push for multi-sectorial collaboration and coordination mechanism, securing high level policy support

Strengthen partnership and coordination mechanisms for sustained TB Care

- Multisectoral coordination/sensitization meeting at central level
- Multisectoral coordination/sensitization meeting at divisional level
- Multisectoral coordination/sensitization meeting at district level
- Regular co-ordination meeting with local government department (12 at present) and facilities under this – UPHCSD, urban dispensaries, local GoB run hospitals (annual/ bi-annual)
- Organize workshop and develop partnership with potential corporate sectors (involving large scale corporate social responsibility programs).
- Workshop for stakeholder mapping
- Develop a health advocacy strategy and periodic follow-up on END TB progress and secure sustained financing for TB & health.
- Organize bi-annual TB KOKUS with Joint Parliamentarian Standing Committee for Health, Cabinet Division including Ministry of Planning and Finance

Improve Financial Capacity ensuring sustained resources for National TB Program Management

The MOHFW aims to achieve efficiency gains through improved budget management and fund absorption capacity (average 90%), which in turn can yield some additional financial resources.

The 8th JMM stated that, there is a lack of clarity on the financial needs for the TB response. The budget estimates for the TB –NSP are out of date and do not reflect current needs such as enhanced case finding in key population, scaling up of molecular testing and digital x-ray for TB diagnosis, and preventive therapy and here seems to be the perception that TB is "already being funded", so domestic resources are shifted away to other programs. Even when the funding from the GoB is available, administrative bottlenecks in fund disbursement have the potential to derail implementation of interventions. The 8th JMM recommended developing a robust and ambitious TB-NSP as a primary advocacy tool (the investment case) and to continue periodic reviews of the financial availability and gaps, taking into account the need to scale up intervention.

a) *Organize quarterly financial workshop to review the financial performance, future planning and cost sharing plan.*

This activity will allow NTP to sustain an efficient financial capacity within NTP and to identify resource gaps considering the updated TB –NSP (2021-2025), TBL&ASP OP in 4th HPNSP and to prioritize allocation for the 5th HPNSP.

b) *Prepare high-level policy brief on TB funding gaps and mapping of available funding sources for high level advocacy on TB Funding.*

NTP is prioritizing the high-level policy advocacy for TB and is addressing the multi accountability framework. A periodic fact sheet on TB will be prepared as a policy brief (investment case) to urge and nudge the GoB to increase more financing for TB.

c) *Conduct TB patient cost survey*

To measure the progress towards high- level End TB Strategy targets, the WHO recommends baseline and periodic measurements using an indicator termed "catastrophic total costs due to TB''. Measurement is based on the conduct a "TB patient cost survey'' examining the costs associated to TB, and can enable the estimation of the proportion of patients experiencing catastrophic costs. NTP already developed the protocol for conducting the "TB patient cost survey'' and plans to implement the survey. Survey findings can be used to monitor financial access barriers and inform related health and policy changes to improve TB prevention and care.

d) *Organize workshop to revise and update the fully costed NSP*

The NTP Strategic Plan 2021-2025 will be reviewed and updated in 2025 to develop a prioritized list of interventions at the scale that is needed to end TB. For this, robust consultative workshop to develop fully costed NSP to define as much as possible the choices that will be made in various funding scenarios, by for example, indicating which interventions will be implemented if 100%, 75% 50% etc. of the resources needed to implement the TB-NSP are mobilized.

e) *Organize workshop to develop a contingency plan for disaster and climate change and to ensure uninterrupted TB services.*

Build, maintain and update Infrastructure for quality TB care (new construction, upgradation and maintenance)

Over the years, full operationalization and utilization of the health and family planning facilities has been a challenge related to infrastructure development and facility - based service provision. The 4th HPNSP prioritized developing a comprehensive construction and maintenance plan for the health and family welfare facilities. NTP in collaboration with the respective operational plan, is developing the infrastructure for a central warehouse, NTRL, CDC, CDH and will do the maintenance as appropriate.In addition, NTP will prepare plans for renovation, refurbishment and maintenance for TB infrastructure.

- Build central warehouse with international storage facility and standard.
- Build, upgrade the divisional/district level storage facilities.
- Conduct annual meeting to prepare yearly maintenance and renovation plan for TB
- Facilities/infrastructure
- Renovation, refurbishment and maintenance for TB infrastructure (NTRL, CDC, CDH) as per annual plan.

Maximize capacity and efficiency of health workforce for integrated TB care

The Bangladesh Health Care System in pluralistic in that a publicly financed health service delivery system co-exists with a privately financed health market which includes the private health care system and an NGO health service delivery system. To increase service effectiveness and efficiency, the GoB will undertake responsibility to sustain TB diagnosis, care and prevention under the leadership of the GoB. This strategy will implement a new service integration model that will improve program efficiency through more effective collaboration with other disease programs as well as better integration of all partner activities in TB control. Implementation of this strategy will be based on a phased approach which will ensure effective implementation of NTP activities at all sites during the transition period.

7.2.2 ENGAGEMENT OF COMMUNITIES, CIVIL SOCIETY ORGANIZATIONS, AND PUBLIC AND PRIVATE CARE PROVIDERS

Promote a rights-based approach to TB care and prevention engaging relevant stakeholders, civil societies and affected communities

Bearing in mind that a purely medical or public health approach is not sufficient in the fight against tuberculosis, and that rights –based, people centered, comprehensive approach to tuberculosis prevention, testing, treatment, care and support, as an integral component of universal health coverage, is essential to ending tuberculosis. The SDG Goal 2030, the political declaration of the UNHLM and the Stop TB Partnership Global Plan to End TB and the WHO End TB Strategy, the NTP 2021- 2025 Strategy all prioritize a new focus on establishing the protection and promotion of human rights, ethics and equity, as well as strong coalitions with civil society organizations and communities, as fundamental principles essential to the tuberculosis response.

a) Conduct workshop to form and continue of TB survivor group.

The TB survivors group represents people affected by tuberculosis, either those with tuberculosis and people who previously had tuberculosis, and tuberculosis key populations such as children, health care workers, indigenous peoples, people living with HIV, prisoners, mobile populations as well as their family members and communities. NTP will facilitate development of TB survivor groups and members will be known as “Bangladesh TB People.” Continue capacity building of TB survivor groups will be one of the new areas of future focus.

b) Organize training for TB survivor group (TB Program, leadership skill, communication and financial management etc.)

Bangladesh TB People, the TB survivor groups will receive training on the TB program for enhancing their knowledge on TB, leadership skills, communication and financial management skill. The capacity building plan aims for the long-term sustainability of the group, who will find local solutions for increasing TB funding and will advocate against TB related stigma to ensure equitable access to TB care with the goal of reducing catastrophic costs related to TB

c) Organize quarterly meeting with civil societies and community representatives/leaders

d) Organize annual conference with civil societies, stakeholders, community representatives and affected people with TB

Every person affected by tuberculosis has the right to participate meaning fully in all TB related platforms and contribute as a representative of TB survivor group in planning, implementing, reviewing progress and taking part in policy and advocacy initiatives along with others stakeholders.

7.2.3 UNIVERSAL HEALTH COVERAGE POLICY, AND REGULATORY FRAMEWORKS FOR CASE NOTIFICATION, VITAL REGISTRATION, QUALITY AND RATIONAL USE OF MEDICINES, AND INFECTION CONTROL

The GoB declared TB as a mandatory notifiable disease in 2014, yet 37% of private providers (PPs) didn’t know about the declaration and were unable to do case notifications as the GoB did not provide any further clarification or facilitate case notifications. In a bid to operationalize mandatory notification of TB in Bangladesh, icddr,b conducted a situation analysis in 2016 with funding support from USAID’s Challenge TB project. The majority of the PPs (84%) had access to internet connectivity and cellular internet was being used by most of the PPs (69%). Among the proposed tools, mobile SMS (61%), smart phone application (51%), email communication (46%), NGO supported staff (32%) and NTP web portal (21%) were considered as preferred ways of notification to NTP by the PPs.

The Bangladesh NTP has also developed a monitoring and evaluation framework for the period 2016-2020. This plan provides a comprehensive approach to the monitoring and evaluation of the TB response under the stewardship of the NTP and in partnership with large NGO implementing partners.

Gaps related to the Tuberculosis Health Management Information System

The following gaps related to the tuberculosis health management information system have been identified:

1. There is a need to accelerate expansion of e-TB manager

2. Inadequate linkages with the private health sector are a major weakness since a significant proportion of missing cases may be in this sector.

3. Sub-optimal approaches to training which is taking place in an ad-hoc fashion and without a training plan.

4. Sub-optimal capacity of the NTP to manage the large data sets generated by the system as a result of the absence at the NTP of a stronger surveillance team.

Activities to address these gaps

- ### Ensure comprehensive monitoring and supervision activities across all TB control interventions

This activity will establish a comprehensive M&E system with the aim of strengthening monitoring and supporting supervision, ensure regular supervision and monitoring of all facilities, implementing a fully digitalized recording and reporting system (with case based functionality) functioning at all levels, capacity building of M&E staff on DHIS2, international reviews through joint monitoring missions, ensuring data quality management, generating data for decision making and ensuring adequate NTP capacity to perform all functions effectively.

During the NSP period, the NTP will take over the responsibilities of digital health technologies supported by its partners. Currently, as many as nine tools are being or planned to be implemented. These are:

1. eTB Manager
2. Mandatory Notification System
3. GX Alert
4. QuanTB
5. Lab MIS
6. TB Asset Management System
7. WIMS (Warehouse Inventory Management System)
8. eLMIS
9. TMIS (Training Management Information System)

Key tasks for the NTP during NSP implementation include:

- Landscaping the existing and future tools and review their scopes and develop an integrated health information architecture for NTP
- Work with partners to develop a sustainability plan and build NTP's capacity (financial, technical and HR) to take over the systems
- Build a dashboard on DHIS2 for decision makers that encompasses all the indicators in a single platform
- Apply the data science techniques and disease modelling & scientific prediction on periodic basis to monitor the program's progress and gaps
- Establish a "Data and Reporting Unit" within NTP to institutionalize data use culture
- Establishing NTP's own data center to ensure hosting all the systems and thus, ensuring MIS patient privacy and data security.
- Develop and implement a strategic plan to implement a mandatory notification system
- Customize/ Improved documentation and data management for childhood TB

Aligning with the NTP vision on technology utilization, the current paper-based CI approaches will be transitioned to digital platforms, such as eTB Manager and the mobile applications developed under Challenge TB. Children identified with presumptive TB at facilities and during CI will be notified to the local basic management units (BMUs), linked to local DOTs centres and engaged with DOT providers. Central data personnel will analyze the process of CI, notification and treatment outcomes to inform national policy. All of this will make child TB more visible for appropriate interventions.

7.2.4 SOCIAL PROTECTION, POVERTY ALLEVIATION AND ACTIONS ON OTHER DETERMINANTS OF TUBERCULOSIS

At current programming, the TB control program is addressing social determinants of TB by supporting the poor and vulnerable populations with social support for MDR-TB, EP-TB particularly nutrition support. To achieve goal 3 of the End TB Strategy NTP will prioritize:

Perform a baseline survey on the costs of TB care incurred by patients and their families to enable measurement of the End TB Strategy impact indicator on catastrophic costs due to TB and address the social and economic needs of TB patients

The collection of baseline data is essential for measuring the End TB Strategy impact indicator on catastrophic costs due to TB and to address the social and economic needs of TB patients.

Map all social welfare schemes currently available for the poor and vulnerable groups in the country and assess how people with TB and their families may derive benefits from existing schemes

Several support schemes for illness-related costs exist in Bangladesh, e.g., through the Vulnerable Group Development (VGD) scheme, but it has not yet been explored how these schemes can be accessed to provide support to TB patients.

Coordinate with relevant ministries and departments and advocate integration of TB into existing social protection schemes, or formulate new ones specifically for people with TB and their families

Under this strategy, the NTP will ensure that a country-wide policy for the prevention of catastrophic costs due to tuberculosis will be available by 2022.

Providing financial support for nutritional support to TB patients: In tuberculosis as in many other infectious diseases, there is a bidirectional interaction between nutritional status and active disease. Under-nutrition is a risk factor for tuberculosis which in turn worsens the nutritional status, generating a vicious cycle which can lead to adverse outcomes (during and following therapy) for patients with active tuberculosis including those with multi-drug resistant TB. This interaction is particularly important in the Bangladesh context where food insecurity and under-nutrition coexist with a large burden of tuberculosis. To address this issue, it is proposed to launch a scheme to provide a monthly cash incentive for every TB patient. All individuals with active TB will receive:

(1) an assessment of their nutritional status

(2) appropriate counselling based on their nutritional status at diagnosis and throughout their treatment.

(3) If undernutrition is identified, it will be managed according to programme recommendations. Linkages for extra nutritional support for TB patients or of his/her contacts on IPT will be extended with existing government schemes like public distribution system (PDS) or applicable food security schemes.

PILLAR 3: INTENSIFIED RESEARCH AND INNOVATION

The components/objectives that falls under this pillar are as follow:

7.3.1 DISCOVERY, DEVELOPMENT AND RAPID UPTAKE OF NEW TOOLS, INTERVENTIONS AND STRATEGIES;

7.3.2 RESEARCH TO OPTIMIZE IMPLEMENTATION AND IMPACT, AND PROMOTE INNOVATIONS

In Bangladesh, medical research is an optional endeavor without a proactive mandatory approach and practice. There are inconsistencies between funding, strategy, personnel, skill and attitude towards medical research in general and TB research in particular. A large number of government departments (Ministry of Health and Family Welfare, Ministry of Science and Technology and different organizations under other ministries) support health research. The Bangladesh Medical Research Council (BMRC), an autonomous organization established under the Ministry of Health and Family Welfare, is the nodal agency responsible for health research in Bangladesh. The main activities of the Council include: organization, promotion and coordination of scientific research in various fields of health science, training of manpower in health research and dissemination of research results for proper utilization. In addition to the BMRC, the Bangladesh Council for Science and Industrial Research (BCSIR), and the University Grants Commission are some of the other national agencies financing health research. Bangladesh is investing in health and health research; however, the last Health Research Strategy Framework was formulated in 2008. At the same time, the Bangladesh Health Care Financing Strategy document (2012 – 2032) includes a section on strengthening national capacity to support information exchange platforms, knowledge hubs, and resources pool. This section underlines an importance for strengthening research capacity in academic institutions and endorses policy relevant research and analysis.
In Bangladesh, tuberculosis specific research has been carried out in academic institutions, national professional associations (Diabetic Association of Bangladesh (BADAS), National Pediatric Association), autonomous research organizations and institutes (icddr'b), and by non-governmental development organizations (BRAC, Damien Foundation, IRD Bangladesh), including pharmaceutical industries.

The National TB Control Programme is based on global scientific and operational guidelines and evidence. As new evidence became available, NTP made necessary changes in its policies and programme management practices. In addition, with the changing global scenario, NTP is incorporating newer and more comprehensive approaches to TB control. To generate the evidence needed to guide policy makers and programme managers, the programme implemented measures to encourage operational research (OR).

The program requires additional knowledge and evidence of the effectiveness of interventions to optimize policies, improve service quality and increase operational efficiency. This has led to the realization of the need for a more proactive approach to promoting OR for the benefit of the TB control efforts. Furthermore, the program seeks to better leverage the enormous technical expertise and resources exist within Bangladesh both within the Program, and across the many medical colleges, institutions and agencies.

Operational research aims to improve the quality, effectiveness, efficiency and accessibility (coverage) of the control efforts. The NTP will continue to promote and support research on issues which are of key relevance to guide interventions and to monitor and evaluate the impact of the programme through collaboration with specialized institutions.

Activities:

- In view of the importance of TB control and the need for TB specific research to provide the evidence for formulating rational TB care policies, it is essential that the NTP collaborate in the National Health Research Strategy development process and possibly introduce the TB Research Strategy covering the full spectrum of research (fundamental, translational, clinical, epidemiological and operational) to be able to channel efforts and funds in the right direction. This will allow Bangladeshi scientists to create a TB scientific network and develop country specific prioritized TB research agenda that will allow Bangladesh to be a model country for TB Research in line with the WHO End-TB Strategy. This requires strong financial and technical commitment from all stakeholders.
- Creating a TB Research Cell (Unit) as part of the NTP with involvement of TB researchers, public health scientists, academia, donor organizations, and civil society engaged in TB control for implementing the research agenda through relevant Task Forces, identifying national and international collaborations and additional funding sources as well as setting up a research assessment process focusing on quality of research outputs (papers published in academic journals and conference presentations) and indicators for TB research environment in the country.
- Operational Research (OR) has been the best means to improve TB control interventions and should be carried out alongside programmatic activities at all levels. For this, a trained focal point for TB OR could be appointed at the national level and each division level. Capacity building should be expanded through workshops, mentorship, trainings possibly targeting junior faculty and students from medical colleges and the NTP staff (all levels).
- The NTP stresses the importance of developing a systematic and fully transparent mechanism to ensure translation of findings from research into policy and practice.
- Coordinate operational and impact research to assess delivery effectiveness and impact on cost reduction and treatment outcomes.

8. IMPLEMENTATION OF THE NSP

The aspirations of the NSP cannot be achieved without the planning and provision of sufficient resources such as time, money, assets and people. The implementation approach is crucial in the planning process that the programme undertakes when developing the operational plans and the annual project implementation plans. A process of monitoring and reporting allows these strategies to be evaluated and alterations incorporated to ensure strategies and actions continue to be in line with delivering the aspirations detailed in the NSP.

Implementation approach

Since the inception of the TB Control Program under the GFATM, both PRs NTP and Brac are operating TB program as vertical interventions with different infrastructures and HR set up at all levels of Upazila, and district levels. The 8th JMM recommended that the role of NGOs can be re-examined and shifted to fit within the public health care system to increase the service effectiveness and efficiency of the GoB to undertake responsibility to sustain TB diagnosis, care and prevention under the leadership of the GoB.

The Upazila Health and Family Officer is the administrative authority and will be the person in charge of TB control activities at upazila level. For ensuring integrated TB Care, the NTP proposes a shifting strategy where NGOs will be embedded in UHCs and District Civil Surgeon Offices facilitate a more cost-effective sustainable TB program within the well-structured public health infrastructure of Bangladesh. This shifting strategy will gradually enhance the capacity of the GoB to focus on health systems strengthening while NGO partners will continue focusing on community system strengthening and a harmonized TB care and prevention effort will be continued to END TB in Bangladesh by 2030.

All existing labs will be continued. Gene Xpert labs will gradually merge with microscopy labs and all labs will be gradually shifted to Government premises. At UHC, 1 MT lab and 2 field officers for upazilas with populations less than 300,000 and 3 field officers for communities with greater than 300,000. These officers will work closely with GoB recruited Tuberculosis and Leprosy Control Assistant (TLCA) and Program Organizer (PO), who will eventually take care of community mobilization and capacity building activities. This was previously facilitated by implementing partners in the training of Shasthyo Sebika, Village Doctors and Opinion Leaders.

The Civil Surgeon will be the key authority in managing TB control activities in his/her respective area of jurisdiction. The role of the Upazila Manager and District Manager will be merged and re-designated as an Area Supervisor who will be responsible for the oversight of implementing partners in six upazilas. With this HR Plan, the scale of supervision by implementing partners will be limited and transferred to the GoB. Area Supervisors will be located at District CS Office to collaborate and facilitate TB activities under the direct supervision of the District Civil Surgeon.

Staffing needs will be independently evaluated and impact of changes on quality of services will be assessed as part of a larger workforce planning exercise, including planning for transition to OP budget (2020 + annual thereafter). NGO upazilla health staff will be reduced gradually and government field staff will be put in place and trained. Government TLCA

capacity will be strengthened to make the interventions functional. The Government Programme Organizer position at district level will be functional.

Surveillance Medical Officer (SMO – follow EPI model) at the district level will be put in place for a strong technical function. The NGO Area Supervisors will support district SMO in oversight management. This position will be phased out if there is evidence that the quality of services is not affected.

Updated Structure:

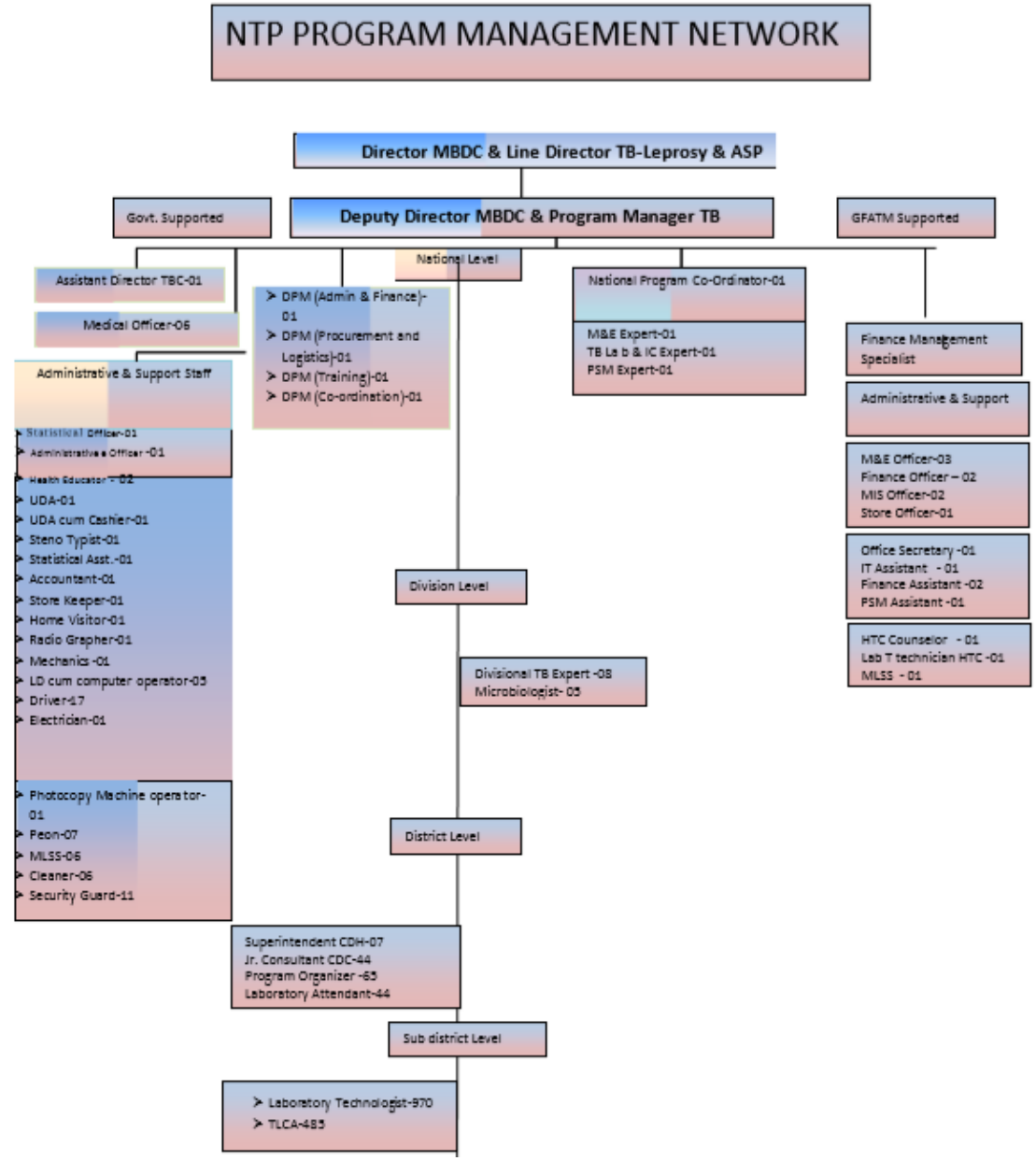


Figure 20 Proposed NTP Programme Management Network

7. BUDGET

A detailed budget in USD for the NSP has been developed using WHO's standard TB planning and budgeting tool. Summary tables for the cost calculations are provided below. The detailed calculations are available in the corresponding Excel file, which form an integral part of the NSP.

Budget (in USD)					
Activities	**2021**	**2022**	**2023**	**2024**	**2025**
Addressing universal health coverage across TB care		1,408,740.51	-	-	-
Build, maintain and update Infrastructure for quality TB care (new construction, upgradation and maintenance)	16,544,532.61	3,899,747.66	2,869,970.19	38,082.14	38,082.14
Capacity building for collection and processing of non-sputum samples to increase EP TB & child TB case detection	1,573,101.46	1,695,460.63	1,865,006.70	2,051,507.36	2,256,658.10
Capacity building on PSM both in core PSM personnel as well as other related (especially at field level)	261,471.12	247,763.94	272,540.33	299,794.37	329,773.80
Community system strengthening to enhance case detection	4,565,084.98	5,011,372.80	5,252,544.19	5,347,749.14	5,664,465.23
Countrywide expansion of the new diagnostic algorithm	4,196,247.78	5,814,225.18	5,396,999.06	7,215,555.49	7,202,807.69
Countrywide implementation of a strategy for treatment of latent tuberculosis infection (LTBI)	8,255,855.86	11,450,770.44	14,087,009.96	16,301,779.47	19,105,851.75
Design and implementation of active case finding activities targeting high risk settings	91,420.82	100,562.90	110,619.19	121,681.11	133,849.22
Design and implementation of activities to increase case finding among specific high-risk areas or population groups	20,456,309.39	20,478,456.47	22,526,302.12	24,778,932.33	27,256,825.57
Ensure adequate diagnosis of patients with presumptive MDR TB at all NTP facilities	1,088,985.52	795,932.29	865,905.40	1,041,464.85	1,145,611.34
Ensure adequate infection control for staff involved in MDR-TB activities	382,569.87	496,455.30	576,727.93	395,583.56	435,141.92
Ensure adequate management of drug side effects (aDSM) under MDR TB treatment	220,757.92	208,117.14	112,845.80	124,130.38	136,543.41
Ensure comprehensive monitoring and supervision activities across all TB control interventions	8,203,456.13	9,849,039.56	7,813,080.63	8,582,098.55	9,705,019.04

Ensure full implementation of WHO's TB-HIV policy	2,166,335.86	2,398,102.23	2,607,976.67	2,862,203.16	3,148,423.47
Ensure fully functional RTRLs	116,984.70	128,683.17	141,551.49	155,706.64	171,277.30
Ensure quality implementation of all NTP activities through establishment of a multisectoral accountability framework for TB (MAF-TB)	50,921.83	32,483.31	35,731.64	39,304.80	43,235.28
Ensure Quality of DOT in both Rural and Urban setting	1,670,459.30	1,869,891.75	2,056,880.93	2,262,569.02	2,488,825.92
Ensure regular maintenance of all diagnostic equipment	125,484.45	138,032.89	151,836.18	167,019.80	183,721.78
Ensure the availability of functioning X-ray facilities at all CDCs and CDHs	17,326,061.60	19,602,115.24	27,941,453.87	2,499,798.97	2,749,778.87
Ensure the implementation of contact screening procedures at all facilities	378,146.20	407,216.57	447,938.22	492,732.05	542,005.25
Ensure the uninterrupted supply of quality-controlled drugs at all facilities	24,375,887.10	27,015,814.32	36,468,324.37	27,189,375.69	29,713,379.45
Expand and strengthen on-going in-service training for all health workers involved in the implementation of TB Control	292,489.44	318,755.37	347,349.58	380,279.81	418,307.79
Implement a comprehensive advocacy and communication strategy	2,113,935.91	2,316,207.54	2,282,673.61	2,828,207.79	3,095,212.79
Implement a comprehensive infection control policy at all implementation sites	401,899.46	173,237.79	104,616.56	115,078.22	102,216.91
Improve Financial Capacity ensuring sustained resources for National TB Program Management	24,973.56	26,355.29	28,990.81	25,823.52	28,405.87
Improve the management of TB cases with co-morbidities including diabetes	285,665.03	783,022.50	1,376,994.80	2,081,931.34	2,914,085.24
Improved documentation and data management for childhood TB	66,828.76	13,480.34	9,221,361.92	16,311.22	17,942.34
Intensify facility based active case finding (ACF) among all children and adolescents with special attention to under-5s	891,621.46	1,227,471.83	1,621,576.05	2,082,226.40	2,618,791.06
Introduction of a fully oral MDR-TB treatment regimen	6,854,443.81	9,779,438.65	10,463,265.14	10,663,749.79	11,730,124.77
Maximize Capacity and Efficiency of Health Workforce for integrated TB care	2,683,877.34	2,952,192.58	3,673,404.47	3,553,130.65	3,881,791.88
Promote a Rights-Based Approach to TB care and Prevention engaging relevant	95,796.38	129,792.22	115,913.63	127,504.99	140,255.49

Stakeholders, Civil Societies and Affected Communities					
Provide palliative care for patients without further treatment options	2,367.63	2,604.39	2,864.83	3,151.32	3,466.45
Provider capacity building for childhood TB	279,901.35	307,891.48	338,680.63	372,548.70	409,803.56
Repair, maintenance and procurement of IT, diagnostic and other fixed assets/equipment	59,098.91	65,008.80	71,509.69	78,660.65	86,526.72
Standardized hospitalization and social support policies for MDR−TB patients and incentive package for MDR−TB DOT Providers across all sites in the country	2,575,634.60	3,351,269.36	3,987,509.85	4,350,979.10	4,699,814.03
Strengthen and expand operational research activities	198,881.01	430,413.77	5,053,566.53	264,710.63	291,181.69
Strengthen community-based Contact Investigations (especially Home Contact Management [HCM])	284,726.63	313,199.29	344,519.22	378,971.15	416,868.26
Strengthen integration of TB data within Robust National Information System	1,059,881.14	878,325.66	585,012.71	656,015.07	704,284.34
Strengthen partnership and coordination mechanisms for sustained TB Care	583,495.78	256,845.36	282,529.89	310,782.88	341,861.17
Strengthen Public-private mix (PPM) activities in TB control	4,831,367.78	5,032,624.50	5,439,323.97	5,935,841.53	6,281,896.03
Strengthen the laboratory network for TB	22,757,908.59	27,362,365.78	49,169,933.41	37,370,401.17	41,095,856.10
Grand Total	**158,394,869.08**	**168,769,486.79**	**226,112,842.18**	**173,563,374.79**	**191,729,969.02**

ANNX-1: IMPLEMENTATION PLAN

ANNEX 1- Gantt Chart

Activity	Tasks	2021				2022				2023				2024				2025			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Child and Adolescent TB																					
	Active case finding in Medical college & district hospitals																				
1.Intensify child and adolescent TB case finding (especially 0 -4 years, 5-14 years, 15-18 years	Active screening & case finding at OPD through FAST strategy																				
	Training of physician at different tiers of health care facility																				
	Updating training materials-training modules																				
	Radiology training material-digital/printed material																				
	Case finding and notification from private hospitals and private chambers (PPM strategy)																				
	Diagnostic Capacity enhancement																				
	Enhance sample collection and transportation system																				
	Child friendly formulations-uninterrupted supply of drugs																				
	Detail and implement the strategy to integrate child TB into MCH in collaboration with IMCI, MCH, NNS, EPI programs																				

2.Strengthen implementation of routine TB contact investigation (especially Home Contact Management [HCM])	Increase IPT enrollment and completion of all eligible children																					
	Operational research for innovative approach																					
	Operationalize standard CI SOP developed in 2016																					
	Roll out contact tracing of bacteriological confirmed cases in the area by GO-NGO health workers																					
	Develop recording and reporting system of CI information at Central level																					
	Monitoring of contact screening activity by district and sub-district health managers (CS and UHFPO) and central level																					
Hard to reach area telemedicine	Preparation of SOP																					
	Orientation training hard to reach area trough telemedicine system																					
1.2 Health Systems Strengthening (HSS)																						
To Strengthen the Capacity of the MOHFW's Core Health Systems (Programmatic and Financial Management, Procurement and Supply Chain Management, Infrastructure Development, High Quality Workforce Development) for integrated, person-centered and sustainable TB care	**Sustained push for multi-sectorial collaboration and coordination mechanism, securing high level policy support**																					
	Organize high-level Policy Meetings and form a multi sectoral coordination body for TB																					
	Organize bi-annual HLM meeting																					
	Organize Round Table Discussion/Policy Advocacy meeting involving key stakeholders, media, TB survivors and civil society																					

within the health service delivery system	Inform Policy Makers & Stakeholders (A2I) - National Level TB Conference Each Year to share END TB Progress																					
	Inform Media & Public (A2I) - National Press Conference Each Year to share END TB Progress																					
	Inform Media and Public (A2I): Divisional Press Conference Each Year to share END TB Progress																					
	Develop Advocacy Tools - Brochure, Policy Briefs, Documentary like TVC, TB-Face - stories/case studies																					
	Develop Brochure / TB Fact Sheet/Bulletin each year during World TB Day																					
	Organize World TB Day Awareness Rally Each Year																					
	Develop a Health Advocacy Strategy and periodic follow-up on END TB progress and secure sustained financing for TB & Health.																					
	Organize annual TB KOKUS with Joint Parliamentarian Standing Committee for Health, Cabinet Division including Ministry of Planning and Finance																					
	Strengthen partnership and coordination mechanisms for sustained TB Care																					
	Multisectoral Coordination/sensitization Meeting at Divisional Level																					

Multisectoral Coordination/Sensitization Meeting at District Level																						
Organize Meeting /event by engaging Youth Volunteers, TB Survivors, Celebrities/TB Champion																						
Integrate TB into PHC delivery system of Urban Health involving public, private and NGO facilities (develop and distribute job aid, TB IEC materials)																						
Organize Workshop and develop partnership with Potential Corporate Sectors (involving large scale corporate social responsibility programs)																						
Workshop for Stakeholder Mapping																						
Integration of TB data within Robust National Information System																						
Organize regular Meetings with DG MIS to review the current status of TB data within DG MIS system																						
Customize/upgrade real-time electronic data capturing for screening/diagnostics, treatment and preventive treatment activities and integrate them into DG-MIS platform (budget for platform development/customization, related equipment, maintenance etc.)																						
Improve Financial Capacity ensuring sustained resources for National TB Program Management																						

Organize Quarterly Financial Workshop to review the Financial Performance, future planning and cost sharing plan *(Identify resources gaps considering updated TB -NSP, TBLepASP OP in 4th HPNSP and prioritize allocation for 5th HPNSP)*																						
Prepare high-level Policy Brief on TB Funding Gaps and mapping of available funding sources																						
Conduct TB Costing Survey																						
Organize Workshop to revise and update fully costed NSP																						
Organize Workshop to develop contingency plan for disaster and climate Change and to ensure uninterrupted TB Services.																						
Build, maintain and update Infrastructure for quality TB care (new construction , upgradation and maintenance)																						
Build Central Warehouse with international storage facility and standard																						
Build, Upgrade the divisional/district level storage facilities																						
Conduct Annual Meeting to prepare yearly maintenance and renovation plan for TB facilities/Infrastructure																						
Renovation, Refurbishment and Maintenance for TB Infrastructure as per annual plan																						
Standardize/harmonize TB care pathway across public-private-NGO facilities to ensure quality person-centered TB Services at all levels																						

Develop SOPs on Referral Mechanism of TB service delivery for public-private-NGO facilities to optimize TB care and responses																					
Develop SOP to define the functional integration between GoB and NGO Staff to optimize the HRM capacity for effective TB care																					
Develop policy and operational plan for effective roll out of contact tracing mass TB preventive treatment																					
Expand screening coverage and integrate best practices to identify missing TB - facility-based active case finding, geographical hot-spot based mass screening at community level using mobile van with in-built provision X-ray and molecular testing																					
Organize co-ordination Meeting with other Health Department for promoting Integrated Patient Centered Approach (Integration with Nutrition, MCH, IMCI, NCDs, Cancer, Renal Transplantation, Diabetes)																					
Print/Reprint SOP, Guideline and Job AID																					
Print and distribute standardize TB Diagnostic Algorithm across TB service facilities in Public, NGO and Private Sectors																					

Integration of TB program with other GoB service outlets - Army, Police, BDR, Port, EPZ facilities and others high-risk population groups to find more missing TB																						
Conduct periodic TB care cascade of analysis to understand and address the service delivery bottleneck and disseminate																						
Formation of a National Committee and organize period meeting of the National Committee to address TB Care and Infection Prevention at Hospital settings																						
Formation of Committee at hospitals and continue Biannual Meeting of multi-department committees to monitor progress, coordinate TB Care and Infection Prevention practices																						
Promote a Rights-Based Approach to TB care and Prevention engaging relevant Stakeholders, Civil Societies and Affected Communities																						
Conduct Workshop to form and continue of TB Survivors Group																						
Organize Training for TB Survivors Group (TB Program, Leadership skill, Communication and Financial Management etc.)																						
Organize Quarterly Meeting with Civil Societies and Community Representatives/Leaders																						

Organize Annual Conference with Civil Societies, Stakeholders and Community Representatives																						
Community System Strengthening - for TB Care																						
Laboratory system strengthening and standardization building a dedicated team for trouble shooting and maintenance supports																						
Laboratory System Standardization, accreditation																						
Expand laboratory/diagnostic network with provision of molecular testing and digital X-ray																						
Build a dedicated technical team for trouble shooting and maintenance - with biomedical managers/technicians																						
Workshop to review and update EQA system (Microscopy and GeneXpert) and develop guideline																						
Ensure quick trouble shooting and maintenance supports on demand																						
Innovation and Research																						
Form a dedicated National committee for TB Innovation and Research																						
Research Committee biannual Meeting/ workshop to prioritize research agenda/issue for TB																						
Competitive Research Grants for TB Research																						
Maximize Capacity and Efficiency of Health Workforce for integrated TB care																						

	Annual Meeting with Institution of Health Technology (IHT) for expanding TB Care	
	Mapping of TB Diagnostics facilities and dissemination - to build/equip staff diagnostic network and laboratory supported treatment care	
	Develop Capacity of the HR in the specific areas of TB services	
	Appropriate Skill-Mix at all levels - Orientation of HR for ACF, contact tracing and TPT, Bi-directional Screening for TB and HIV, TB and Diabetes, linkage between TB and RMNCAH, TB and Nutrition	
	Explore/Use Digital platform for large number of health care providers for screening, contact tracing, training/mentorship activities	
1.3 PSM		
	Establishing a completely new central warehouse through government funding in a government owned space	
	Collect case data and proper quantification	
	Collect national data on targeted number including regimen of LTBI	
	Proper quantification	
	Supply/distribute the drugs as per demand	

Ongoing update of integrated LMIS tool (including new TB 08, Lab items and logistics)																						
Refresher trainings of the relevant staff on electronic LMIS																						
Ensure electronic data quality and reports																						
Transition of LMIS (Logistics Management Information System) functions from paper based to paperless																						
Developing SOP and framework for distribution of TB drugs and supplies																						
Building a supply team (recruitment as required)																						
Long term contract out for fleet management																						
Route plan, records and reports of distribution,																						
Ensure maintenance of optimum temperature and other quality parameters during the transportation in order to avoid degradation of efficacy/quality of medicines and other supplies																						
Setting up and monitor performance indicators																						
Improve storage area at upazila and district level (following initiatives from MOHFW)																						

Improve and maintain ideal storage condition in terms of environmental control (Temperature, Humidity etc.), safety, security, racking, shelving etc.	.																					
Conduct regular supportive supervision visit by PSM team from central to facility level																						
Include and/or update key PSM related indicators in field-based supervision (general) check list																						
In coordination with M&E analyze records and reports on supervisions to measure the key PSM performances																						
Holding consultative workshop in coordination with relevant stakeholders																						
Follow up on progress at a regular interval																						
Assessment (or a cross sectional study) on the availability and use of commercially available preparations of anti TB drugs																						
Capacity building of the DGHS personnel on quantification, forecasting, early warning system and other priority PSM issues.																						
Follow up on progress through involving in procurement projection and management																						
Arrange consultative workshops including key stakeholders exploring the																						

scopes for registration of TB drugs in DGDA																					
Based on the local manufacturers' capacity to manufacture quality assured and EQA tested drugs in the country, and in coordination with DGDA																					
Recruit and deploy a team for drugs supply and distribution																					
Recruit personnel to undertake IT software and hardware related advancement in functionalities																					
Capacity building on supply and distribution (on the job training as regular activities)																					
Capacity building of the DGHS/NTP personnel on quantification, forecasting, early warning system and other priority PSM issues.																					
Capacity building of DGHS recruited Storekeeper at different level on key supply and storage functions related to TB drugs, lab consumables and supplies																					
Multi-year contract with IT company/is for the maintenance and/or further development of electronic tools used for PSM and other functions.																					

	In coordination with DGHS MIS, build adequate technical capacity within NTP to maintain IT companies and/or IT contract, management of deliverables.	
	In coordination with relevant departments in NTP, prepare procurement plans and eventually execute those procurement functions. Considerations on life cycle, issues with warranty, servicing and repair/maintenance should be important factors in this relation	
	Capacity building of relevant personnel on asset management	
	PSMWG meeting	
1.4 ACSM		
	To ensure enabling policy environment towards achieving multi-sectoral response on TB	
	High level issue-based policy advocacy meeting with political leaders/MPs, TB parliamentary caucus	
	Inter-ministrial & multisectoral meeting (Health, Education, BCCM)	
	Round table meeting,	
	Journalists' orientation	
	Media award	
To create greater awareness on TB Diagnosis, Treatment and Prevention at National Scale in order to enhance people's access to TB information and services		
	TB message telecast through TV (1 for each district)	

TB message telecast through Radio (# of channels)																						
TB message telecast Cable-TV Newspaper/magazine																						
TB message publish in Newspaper/magazine																						
Observance of World TB day (In each Upazila)																						
Community campaign																						
TB message production and distribution of posters, stickers, leaflets (1 page) etc. at all levels																						
Signboard & Billboard (New & Maintenance)																						
TB awareness in educational institutions and quiz competition at schools (district wise)																						
TB Ambassador (One Celebrity)																						
TB Champion																						

To strengthen engagement of all health authorities and service providers (formal/non-formal)

Community meetings and/or orientation for opinion leaders, religious leaders, teachers, Pharmacists, village doctors																						
Meeting with GPP involving govt. health(1 in each district in each quarter)																						
Workshop/Conference/meeting with professional bodies (BMA, BLF, BPA etc.)																						
Orientation of cure TB patients and local elites (Upazila wise- 1 in each upazila in each quarter)																						

	Networking, collaboration/coordination, sensitization and advocacy meetings																					
	Divisional level sensitization meeting																					
	District NGO Coordination Meeting (DC Office)																					
	District Health Coordination meeting at CS Office/Sadar Hospital																					
	Upazila Coordination meeting (UNO)																					
	Upazila Health Coordination meeting (UHFPO)																					
1.5 Infection Control																						
	Establish an effective sustainable system of Assessment, Planning and Monitoring for infection control at all TB health facilities																					
	Review and updating of Infection Control (IC) Guideline																					
	Sensitization meeting with local health authorities																					
	Formation of Infection Control Committee or selection of **a Focal person** for all TB clinic/health facility for IC																					
	Annual assessment of IC status in all TB health facilities by Committee/focal person																					
	Promote integration of TB infection control into general infection control																					
	Regular **monitoring of IC activities**																					
	Implement FAST strategy at TB health facilities																					

Orientation and awareness raising of Medical professionals, health staff and TB clinic/lab staff on IC and on implementing FAST strategy																					
Select a person/staff at entry level and ensure separation of TB symptomatic from others and referral for TB services																					
Encourage **use of surgical masks** for sputum positive TB patients, especially for MDR-TB patients																					
Start diagnostic and treatment process within minimum possible time by prioritizing the patients with the consideration of severity of illness																					
Infrastructural development and/or physical arrangements for infection control																					
Ensure **adequate ventilation** (natural or mechanical) for TB lab/clinic/hospitals																					
Ensure **safe sitting arrangement** for staff in TB clinic & labs considering air flow in the room																					
Use **Ultraviolet light** in hospital indoor rooms for sputum positive MDR patients																					
Ensure safe process of clinic/lab (medical) waste disposal																					
Ensure **three colour waste bins** for putting clinic/lab wastes (for disposal) in each TB health facility (black bin for general waste, yellow bin for infectious materials and red bin for sharp material.																					

	Ensure **segregation of infectious, non-infectious and sharp materials** and **put in the specific colour bin**																					
	Dispose wastes in safe place or incinerate																					
	Ensure personal protective measures for infection control																					
	Ensure **use of N-95 respirator** by Doctors/Nurses/DOT providers/Lab & clinic staff, especially during dealing with MDR TB patients with sputum smear positive results																					
	Ensure **use of hand globes** while handling infections materials																					
	Prevention of spreading infection at the community level																					
	Raising awareness of patients & their family members on infection control through **health education at clinic and at in community** (cough etiquette, use of surgical masks, ventilation of patients living room etc.)																					
1.6 Laboratory																						
	Expansion of GeneXpert facilities in all upazilas and large public/private hospitals throughout the country to increase TB and DR TB case detection.																					
	Procurement of GeneXpert systems & other logistics (Online UPS, AC, Furniture, consumables)																					
	Site assessment and selection for Xpert placement																					
	Site preparation																					
	Training & refresher training																					
	Installation																					

Supervision & monitoring																					
Countrywide replacement of ZN microscopy by LED microscopy																					
Training & refresher training on LED microscopy																					
Phase by phase replacement of ZN by LED microscope																					
Monitoring & supervision																					
Establishment of liquid culture & DST facility (MGIT) in all RTRLs.																					
Upgrade RTRL Shamoli, Rajshahi & Khulna as BSL 2 and standard to start liquid culture																					
Training on MGIT																					
Installation of Liquid culture system																					
Establishment of LPA facilities (1st & 2nd line) at regional reference laboratories.																					
Renovate RTRLs to start LPA activity																					
Training																					
Installation																					
Supervision & Monitoring																					
Ensure X-Ray facilities in all CDH and CDCs/district level hospitals to facilitate cases.																					
Procurement of X-Ray machine																					
Site assessment and selection to install X-Ray machine																					
Site preparation																					
Radiographer recruitment/placement																					
Installation																					
Supervision & monitoring																					
Implementation of new diagnostic algorithm to ensure maximum utilization of advanced diagnostic tools.																					
Orientation & sensitization on new diagnostic algorithm																					
Supervision & monitoring																					

Ensure regular maintenance and operational support for smooth implementation of Xpert (e.g.: module replacement, laptop/desktop computer troubleshoot, timely calibration, power backup)

Purchase warranty extension agreement with Cepheid																				
Strengthen coordination between NTP and Cepheid local service provider																				
Start dialogue with Cepheid to keep at least 30% spare module and spare laptop in country for immediate replacement																				
Ensure daily, weekly and monthly maintenance of Xpert with proper recording by the lab staff																				

Ensure all equipment is serviced, calibrated and maintained as recommended by the manufacturer and technical agencies to enhance the quality of TB laboratory services

Budget allocation & mobilization for regular maintenance of lab equipment.																				
Annual Maintenance Contract with local service provider to troubleshoot lab equipment																				
Maintain logbook regularly																				

Establish standard EQA system for Xpert to ensure quality laboratory services.

Preparation of EQA panel for GeneXpert laboratories by NTRL and respective RTRLS																				
Distribution of EQA panel to the GeneXpert sites once a year																				
Recording and reporting																				
Supervision & Monitoring																				

Capacity building for collection and processing of non-sputum samples at RTRLs to increase EP TB & child TB case detection.

SOP development to collect non sputum sample for GeneXpert testing																				

Develop SOP for EP TB sample processing for lab staff																						
Training on EP TB sample collection																						
Training on EP TB sample processing for lab staff																						
Training & refresher training should be organized on different TB diagnostic tools for laboratory staff (Public & private both)																						
Continue training and refresher training on different diagnostic tools																						
Develop a mechanism and process of regular proficiency testing (WHO panel) of all culture labs under NTP laboratory networks.																						
Strengthen linkage between NTRL & SRL																						
Develop strong network with NTRL & RTRLs, distribution EQA panel to RTRLs from NTRL once a year																						
EQA report evaluation and feedback by NTRL through NTP																						
Accreditation of NTRL and RTRLs.																						
Landscape analysis																						
Initiate the accreditation process																						
Apply for laboratory accreditation																						
Develop a Tor for NTRL and RTRLs and clarify the role and responsibilities																						
Organize a lab core group meeting at NTP and develop TOR for NTRL & RTRLs																						
Endorsement of TOR by NTP																						
Establish an interoperable electronic database to manage the reporting system of laboratory and gene expert network (Gx-Alert)																						
GX-Alert tools procurement																						
Training on GX-Alert																						
Installation																						
Supervision & monitoring																						

	Establish a logistic and asset management system in the NTRL and RTRLs																					
	Develop logistics & asset management system tools by NTP																					
	Assign and train respective lab people to manage the system																					
	Strengthening sample transportation system																					
	Revise and update existing SOP for sample transportation																					
	Ensure budget allocation form sample transportation																					
	Ensure logistical support																					
	Training																					
	Implementation																					
	Continuous monitoring																					
1.7 M & E																						
	Strengthening Monitoring and supporting supervision																					
	Conduct Routine supervision from Central level																					
	Conduct Routine supervision from divisional level to District/ Upazilas by Divisional																					
	Conduct Routine supervision from District level to Upazilas																					
	Joint Supervision and Monitoring visit																					
	Periodic laboratory supervision from the central level involving lab personal																					
	Conduct Routine supervision by District and Upazila Health manager																					
	Strengthen coordination with stakeholders																					
	Quarterly Monitoring Meeting																					

Quarterly M&E working group meeting at central level																						
Bi-annual TB & HIV NGOs performance review and coordination meeting																						
Quarterly coordination/partners performance review meeting including divisional Experts & Microbiologists																						
Quarterly Program Management meeting including divisional Experts & Microbiologists																						
Biannual coordination/partners meeting at national level (MDR-TB)																						
Quarterly TB Technical working group meeting																						
Quarterly Staff Meeting of SRs																						
Maintenance & Fuel cost for Vehicles (Jeeps & pickups etc.)																						
Biannual coordination/partners meeting at national level (LTBI)																						
Quarterly performance review (SR/ PR/ lab/ QA and etc.) meeting																						
Annual performance review and planning meeting																						
Biannual coordination and partners meeting																						
Biannual Child TB working group meeting																						

Fully digitalized recording and reporting (both aggregated and individual patient tracing) system functioning at all level (e-TB manager, DHIS2 and etc.)

Procure logistic (laptop, modem, Tab and etc.) for electronic recording and reporting for all reporting sites																					
Maintenance Digital alert mandatory notification																					
Monitoring system for TB drugs and logistics																					
Capacity building for data entry personnel at district and sub district level																					
server and archive management																					
Software update, App development and update																					
Maintenance cost for software																					
Maintenance cost for logistic replacement and repair																					
Capacity building on electronic recording and reporting for Manager																					
Capacity building on data for decision making																					
Building interoperability among all digital systems																					
Include QC report, Gene Xpert report and other reports in e-TB manager																					
Refresher training on electronic recording and reporting																					
Training on update version																					
Capacity building of M&E unit																					
Capacity building for M&E personal																					
Capacity building for manager on electronic recording & Reporting																					

Attending international tanning, meeting and workshop on M&E																						
Exposer visit of TB programme/new intervention																						
Capacity building on electronic monitoring system																						
Attending international conferences and meeting																						
National and international training on data management																						
National and international training on financial monitoring and management																						
Joint monitoring mission																						
involvement of International and national expert to conduct JMM																						
Workshop for conduct JMM																						
Logistic support for JMM																						
Organize dissemination workshop on JMM																						
Report writing and publication of JMM																						
Monitoring and Evaluation Plan for 2021 to 2025																						
Engage International and national expert to update M&E plan																						
Workshop for conduct M&E plan																						
Logistic support for M&E plan																						
Organize finalization workshop on M&E plan																						
M&E plan writing and publication																						
Data quality management																						
MIS validation																						

Orientation on data quality management																					
International and external Audit																					
Training on Data audit, data management and data quality management																					
Workshop on data for decision making																					
Survey and operation research																					
A prevalence survey will be conducted within 2025																					
Mortality survey																					
Publication annual report																					
conduct operation research and publish in peer review journal																					
TB diabetic prevalence survey																					
Regular Monitoring and supervision																					
Procurement and replacement of vehicle for monitoring and supervision from central level to upizala level																					
fuel and maintain for vehicle																					
Monitoring and supportive supervision cost for programme staff																					
Maintenance & Fuel cost for Mobile X-ray with Van																					
Monitoring Supervision and Travel																					
Other cross cutting issues																					
Dedicated HR for all Gene Xpert sites																					
Ensure field staff (TLCA) and lab staff at all level																					

Website and digital archive maintenance																						
PMDT																						
Identify >90% of the estimated DR TB																						
Ensure GeneXpert testing of all DR presumptives																						
Ensure GeneXpert testing of new sm+ve TB																						
Identify Child DR TB																						
GeneXpert testing child TB specimens																						
Ensure 2SLPA for RR samples (at start)																						
Social support																						
Treatment support (AE management, DOT support)																						
Psychological support (counselling)																						
Ambulatory treatment fully from day 1																						
All oral STR for MDR TB																						
Orientation / Training of providers																						
Number of patients on all oral STR																						
2nd line LPA and liquid culture																						
Procurement and installment of 2SLPA																						
SOP development																						
Orientation and operationalization																						
Monitoring of AE																						
Palliative care for DR TB patients																						
Ensure palliative care for DR TB patients																						

	Capacity development (providers)																					
	Infra-structure for palliative care																					
	Establish patient support group for DR TB																					
	Establish linkage with HSS group (stakeholders)																					
	Identification of potential members																					
	Formation of groups																					
	Capacity development and organization of meetings																					
	Civil society engagement																					
1.8 PPM																						
	Strengthen existing government services and enhanced collaboration with other implementers (public and private)																					
	Establish digital chest X-ray systems in all CDCs and CDHs	-	-	-		-		-	-	-	-	-	-	-	-	-	-	-	-	-		
	Functionalize all the Xpert systems in the CDCs and CDHs	-	-	-		-	-	-	-	-	-	-	-	-	-							
	Expansion of Xpert systems and X-ray in government and private centers to cater all patients from both public and private sector	-	-		-	-	-		-	-	-		-	-	-		-	-	-	-		
	Maintenance of Xpert systems and X-ray in government and private centers to cater all patients from both public and private sector																					
	Scale up FAST approach along with TB IC in public and private facilities	-	-	-		-	-		-	-	-		-	-	-		-	-	-			
	Provide human resources with specific assignments for TB services at FAST facilities																					

Provide human resources with specific assignments for TB services at X-ray, Xpert facilities	-	-																			
Training for capacity building of the newly recruited staff at FAST facilities		-	-		-	-		-	-	-		-	-	-		-	-	-	-		
Training for capacity building of the newly recruited staff at X-ray, Xpert																					
Ensure effective PPM leadership through high level engagement, active oversight and resource mobilizations																					
Maintain existing community TB activities Organize regular training sessions for private providers from both the formal and informal sectors in all districts																					
Ensure 100% presumptive referral from private sector to the NTP supported facilities for diagnosis by 2023	-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		
Involve the professional associations Organize regular training sessions for private providers from both the formal and informal sectors in all districts																					
Organize regular training sessions for private providers from both the formal and informal sectors in all districts																					
Ensure proper management of TB cases in the private sector following national guidelines by 2024																					

Ensure 100% notification of TB cases from private sector by 2022	-	-	-		-	-	-		-	-	-		-	-	-		-	-	-		
Procure smart phone and SIM	-	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orient PPs on MN application																					
Develop and distribute promotional materials, advertisement using print and electronic media for mandatory TB notification system																					
Increase access to TB services for the vulnerable population	-	-		-		-		-		-		-		-		-		-			
Orientation workshops for factory workers	-	-		-		-		-				-				-		-			
Sensitization Meeting with other business associations by BGMEA/BKMEA	-	-	-		-		-		-		-		-		-				-		
Scale up accesses of TB services to Prisons																					
Scale up accesses of TB services to slums																					
Scale up accesses of TB services to Ethnic groups, tea/rubber garden workers																					
Orientation of cured TB patient/TB Club meeting /community DOT providers/CSP (community service provider)																					
TB Campaign at Sub district/Urban areas (Remote and underserved areas)																					
TB Screening for under 15 years age group/elderly/pregnant women (Under-served and high-risk population)																					

	Sputum camp at factory/garment/workplace (Under-served and high-risk population)																					
	Screening among Driver's (Track, Bus, Tampu) at district terminal (Special and underserved population)																					
	Organize sputum collection/ smearing centers in key population (Slum, refugee, brick field, mine, tea garden and others)																					
	Incentive for outreach sputum collection to intensify service at special situation																					
	TB Screening among Prisoners																					
1.9 TB HIV and other comorbidities																						
	TB HIV																					
	Ensure HIV screening for all TB patients in High burden districts																					
	Establish special HTC centre in DR TB treatment initiation centre																					
	Ensure EQA system																					
	Continue diagnostic and nutritional support for TB HIV patients																					
	Continue screening of all HIV patients for symptoms of TB, the diagnosis of HIV-positive symptomatic on the basis of gene Xpert and other high-risk group																					
	Continue provision of IPT to all HIV-positive contacts of TB cases																					

	Bilateral meeting with NTP, NASP and other implementing partners regularly																					
	Capacity building of all level of health care provider																					
	Updated TB HIV Guideline																					
	Dedicated human resource																					
	TB Diabetes																					
	Blood sugar screening for all TB patients above 35 years old																					
	Ensure referral of patients with high blood sugar level to physician																					
	Ensure TB screening for all presumptive diabetic patients																					
	Capacity building of all level of health care provider																					
	Updated TB Diabetes guideline																					
	TB and other comorbidities (Kidney disease, Liver disease)																					
	Ensure referral of TB patients with other comorbidities to physician																					

ANNEX-2: SWOT ANALYSIS

SWOT analysis for NTP

Strength	**Weakness (Areas of Improvement)**
1.High level political and administrative commitment 2. Deliberate efforts to move away from the routine and set aspirational goals, targets with strategies and actions to match. 3. Availability of new drugs, regimens, diagnostics, approaches and strategies to end TB. 4. TB services are integrated with well-structured PHC 5. Community based DOT 6. TB laboratory network has a well-defined four level structure 7. Molecular diagnostics (Xpert MTB/RIF) introduced and planned to be expanded nation-wide by 2025 8. Strong PSM unit with uninterrupted supply of drugs and logistics 9. Successful PPM models with private formal and non-formal providers	1.TB programme structure unable to cope with the growing demands for ending TB 2.Limited human resources at NTP which severely limits programme management 3. Low case detection specially Child TB and MDR TB- 4% and 20% of the estimated burden 4. Access to molecular diagnostics, X-ray and FNAC is limited, diagnosis of EP TB remains challenging 5.EQA system of molecular diagnosis yet to establish 6. Ambulatory treatment for DR TB

Opportunity	Threat
1.Universal Health Coverage 2. Integration with IMCI, NNS, MNCAH, MCRAH OPs 3. Strong commitment of NTP and partners to strengthening TB services at all levels 4. Availability of infrastructure at all levels under MOHFW 5. Availability of international tools, material, training and technical assistance capacity 6. Increased focus on TB operational research 7. Existing national hospital waste management regulations. In-country innovations and pilots with potential for replication and scale up. 8. SDGs and End TB strategy provide ambitious targets to aim for by the national efforts	1.Insufficient budgetary outlay for health in the national budgets compromising the allocation to TB. 2. Global and national commitment may be shifted to emerging infectious diseases.