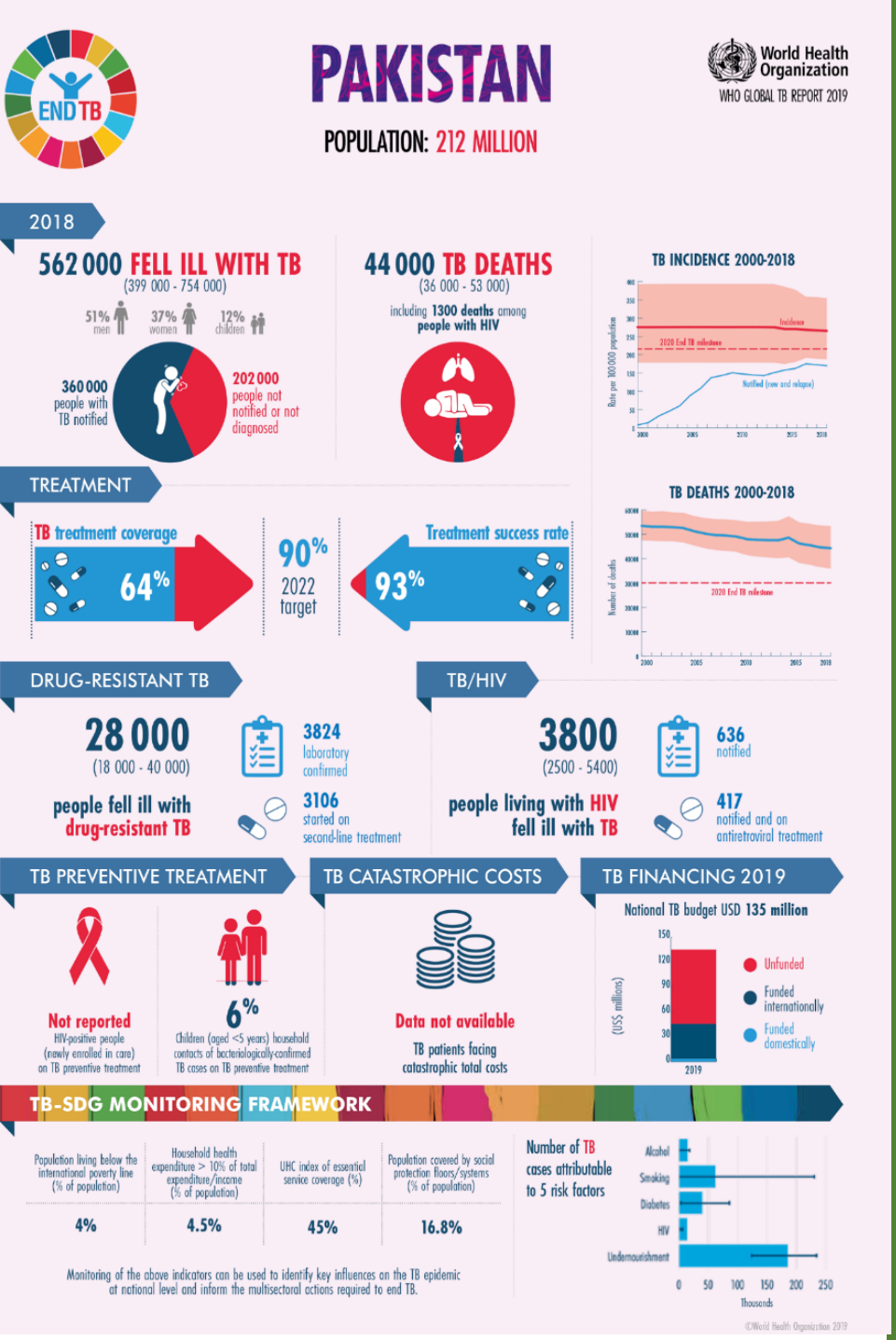

ANNUAL REPORT 2019

TOGETHER

National TB Control Program

NATIONAL TB CONTROL PROGRAM PAKISTAN

ANNUAL REPORT 2019

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MESSAGE FROM THE NATIONAL COORDINATOR

Pakistan is the world's sixth most populous country with an estimated population of 218 million in 2019. TB is one of the major public health problems in Pakistan, with the country ranking fifth among TB high-burden countries worldwide.

We stand at crossroads as Pakistan move from the 2015 Millennium Development Goals to the Sustainable Development Goals for 2030. Integral to this transition, the world community on general and Pakistan is launching a dramatically accelerated fight against tuberculosis (TB) and for those most affected by it: the poorest, most vulnerable, socially marginalized and inequitably served. TB is a public health scourge, a health security threat and a development challenge which needs a unified, cross cutting inter sectorial approach.

It is evident that Pakistan has managed to effectively prioritize and implemented programs to halt rising trend of TB cases; but it is now very important to identify all TB cases early, treat with appropriate regimen and cure them all. Special attention is now needed for vulnerable populations which include children and women, people living with HIV, people with diabetes, refugees, prisoners and other population whose access to basic health care services is compromised.

We are thankful for the deep engagement of National Program under the Ministry of National Health Services, Regulations & Coordination, other governmental authorities, civil society representatives, development and public health experts, and researchers for an utmost effort to implement END TB STRATEGY. We are all committed to support the robust roll-out of implementation despite challenges and constraints. The time to gear up and to act is now.

As, we are moving towards ending TB, I urge for united approach among government, partners, NGOs, private sectors and other stakeholders to “Unite to END TB”.

Dr. Rana Muhammad Safdar
National Coordinator,
Common Management Unit for AIDS, TB & Malaria,
Ministry of National Health Services, Regulations & Coordination,
Islamabad

MESSAGE BY NTP MANAGER

Tuberculosis is still considered to be one of the major public health problems of Pakistan. According to Global TB Report 2019, Pakistan ranks 5th among 30 high-burden countries for TB and 5 th for Drug Resistant TB (DRTB), the estimated TB incidence and mortality remained at 265 and 340/100K respectively with an estimated burden of 562,000 new TB cases.

NTP through its strategic implementation plan1 have committed to END TB by 2035. National Strategic Plan have focused on increasing case notifications of both drugs sensitive and resistant cases, maintain good treatment success rate for drugs susceptible cases and for MDR TB cases, engage public and private providers, strengthen community system and develop comprehensive monitoring and evaluation system.

Since the declaration of TB a national public health emergency through the “Islamabad Declaration”, TB control Program has treated nearly 4 million people with quality assured drugs since its revival while maintaining the treatment success rate of more than 90%. Although steady progress has been made from 2001 to improve case detection, TB continues to be a major public health problem.

The country has developed National and Provincial Strategic Plans in the perspective of devolution, addressing the drivers of the epidemic and builds on the achievements of the previous plans and to scale up evidence-based interventions while ensuring a high quality of service delivery. It is a framework that will guide the activities of all stakeholders including the national, provincial, regional and district governments, development partners, civil society, international agencies, research institutions, and private sector who all work together to eliminate TB in Pakistan.

The annual report for TB aims to witness the performance of National TB Control Program Pakistan against the pre-defined key indicators vis-a-vis challenges to be addressed and to pave a way forward towards the elimination of TB. This report can also be used as a reference document for the consumption of internal/external evaluation, strategic planning, operational research and review mission etc.

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ACRONYMS

ADR	Adverse Drug Reaction
AFB	Acid Fast Bacilli
AJ&K	Azad Jammu & Kashmir
AKU	Aga Khan University
BHU	Basic Health Unit
BMU	Basic Management Unit
CCM	Country Coordinating Mechanism
CDC	Communicable Disease Control
CHW	Community Health Worker
CHS	Community Health Solutions
CMU	Common Management Unit
CPT	Co-trimoxazole Preventive Therapy
DGHS	Director General Health Services
DHIS2	District Health Information System2
DHQ	District Headquarter Hospital
DLS	District Laboratory Supervisor
DMU	Drug Management Unit
DTC	District TB Coordinator
DOTS	Directly Observed Treatment (short course)
DR TB	Drug Resistant TB
DS TB	Drug Susceptible TB
DRS	Drug Resistance Survey
DST	Drug Sensitivity Testing
EDO	Executive District Officer
EQA	External Quality Assessment
EPTB	Extra Pulmonary TB
FATA	Federally Administered Tribal Area
FLD	First Line Drug
FQ	Fluoroquinolone
GB	Gilgit Baltistan
GDF	Global Drug Facility
GF	Global Fund
GFATM	Global Fund to Fight Against AIDS, Tuberculosis and Malaria
GP	General Practitioner
GSM	Green-star Social Marketing
HCP	Healthcare Practitioner
HIV	Human Immunodeficiency Syndrome
HPF	High-Power Field
ICT	Islamabad Capital Territory
IEC	Information, Education & Communication
IGRA	Interferon Gamma Release Assay
IHN	Indus Health Network
INH	Isoniazid
IPC	Interpersonal Communication
KP	Khyber Pakhtunkhwa
LED	Light Emitting Diode
LHW	Lady Health Worker

LPA	Line Probe Assay
LTBI	Latent TB Infection
MALC	Marie-Adelaide Leprosy Centre
MC	Mercy Corps
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
MDR-TB	Multi-drug Resistant Tuberculosis
MO	Medical Officer
MoNHSR&C	Ministry of National Health Services, Regulations & Coordination
MS	Medical Superintendent
NGOs	Non-government Organizations
NRL	National Reference Laboratory
NSP	National Strategic Plan
NTP	National Tuberculosis Control Program
OIG	Office of Inspector General
PATA	Pakistan Anti-TB Association
PCS	Pakistan Chest Society
PC-1	Planning Commission Proforma-1
PSCM	Procurement & Supply Chain Management
PHC	Primary healthcare
PF	Performance Framework
PTB	Pulmonary TB
PMA	Pakistan Medical Association
PMDT	Programmatic Management of Drug Resistant TB
PPHI	People's Primary healthcare Initiative
PPM	Public Private Mix
PR	Principal Recipient
PRL	Provincial Reference Laboratory
PSCM	Procurement & Supply Chain Management
PTP	Provincial Tuberculosis Control Program
RHC	Rural Health Centre
RR-TB	Rifampicin-resistant TB
SDG	Sustainable Development Goals
SLD	Second Line Drug
SPDC	Social Policy & Development Centre
SR	Sub Recipient
STAG-TB	Strategic & Technical Advisory Group on TB
TB	Tuberculosis
TBC	Tuberculosis Clinic
THQ	Tehsil Headquarter Hospital
TST	Tuberculin Skin Test
UNDP	United Nations Development Program
UNHLM	United Nations High Level Meeting
UNODC	United Nations Office on Drugs and Crime i
WRD	WHO-approved Rapid Diagnostics
XDR-TB	Extensively Drug-resistant TB

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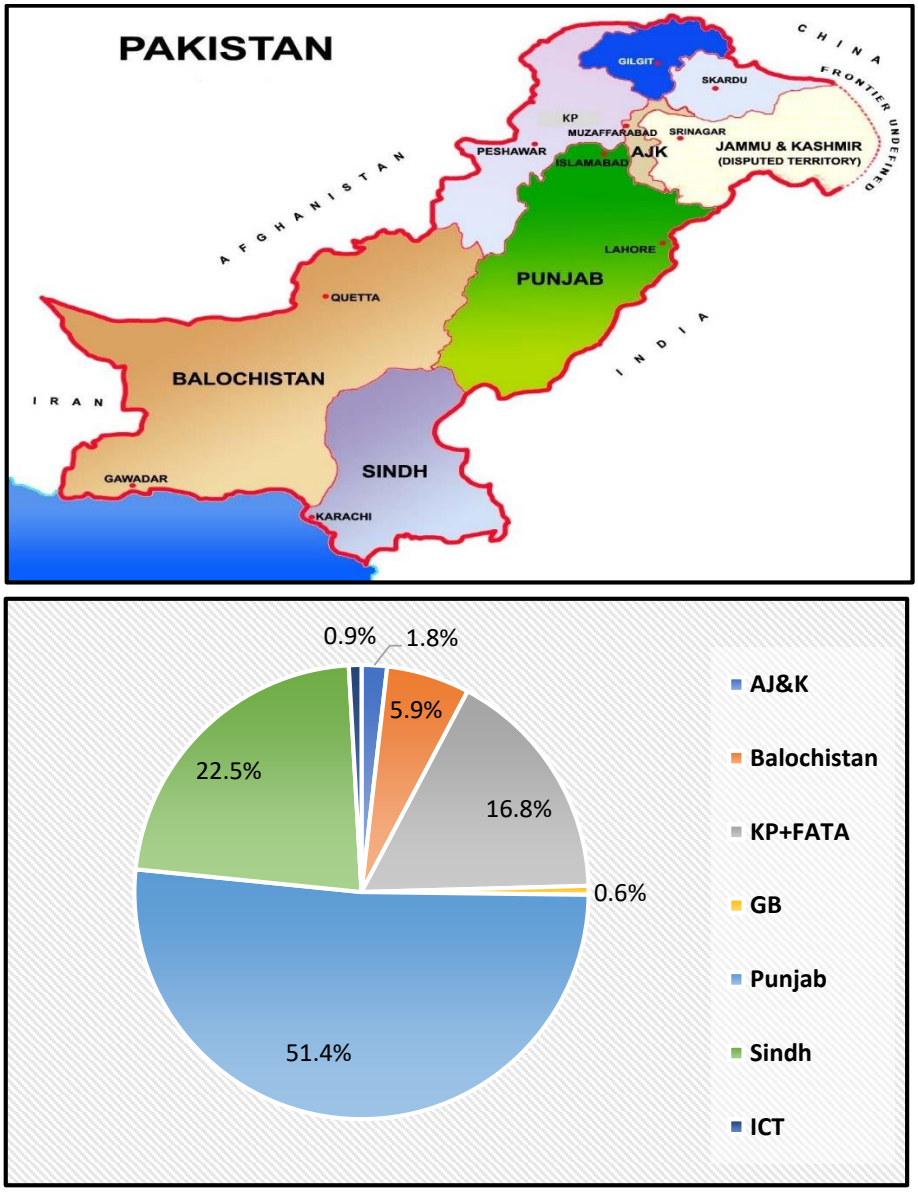
CHAPTER 1. COUNTRY OVERVIEW

Islamic Republic of Pakistan is a country in South Asia spanning over 881,913 square kilometers (340,509 square miles) with 1,046-kilometer coastline along the Arabian Sea and the Gulf of Oman in the south. Country is bordered by India to the east, Afghanistan to the west, Iran to the southwest, and China in the far northeast.

Pakistan is a federation that comprises four provinces: Punjab, Khyber Pakhtunkhwa (+ FATA), Sindh, and Balochistan and three territories: Islamabad Capital Territory, Gilgit-Baltistan, and Azad Jammu & Kashmir.

Pakistan is the world's sixth most populous country with an estimated population of 223 million in 2019 (6th Population and Housing Census, Pakistan Bureau of Statistics 2017). Punjab and Sindh are the most densely populated provinces of the country. Whereas the regions and territories contribute less than 10% of the total population of Pakistan.

FIGURE 1. Population contribution by province in Pakistan during 2019



Pakistan is a low middle-income country with nominal GDP per capita of $1,482 in 2018. Total life expectancy at birth is 66.4 years and approximately 35% of the population is under 15 years of age. More than 60% of the total population lives in rural areas like other South Asian countries, health and sanitation infrastructure is adequate in urban areas but is generally poor in rural areas. Factors like poverty, malnutrition, poor housing and sanitation, inadequate health care facilities, population migration and urbanization, political instability and refugee are key challenges in health care in country. According to data from the World Bank, Pakistan spends USD 39.4 per capita on health; this expenditure is lower than the WHO's prescribed minimum spending package of per capita USD 44. The total public health expenditure as percentage of GDP has increased to 0.45% in 2016. (23)

1.1. Healthcare System in Pakistan

Pakistan's health care delivery system includes provincial and district public health departments, other government sector organizations (including armed forces), non-governmental organizations (NGOs) and private sector with profit and not for profit service provision. An estimated two third of the population initially accesses health-care through private sector. Despite the significant role, the private sector is largely unregulated and functions predominantly for profit. The Federal Ministry of Health (MoH) was dissolved in June 2011 and the overall responsibility for health services was devolved to the provinces. Provincial healthcare Commissions are striving for developing and enforcing Minimum Service Delivery Standards (MSDS) to be implementing at all levels of healthcare. The public sector is the main source for the provision of preventive care and hospital care to the urban and rural population. Communicable diseases are still leading causes of morbidity and mortality and non-communicable diseases are on the rise.

Prior to the Devolution of the Health Sector in Pakistan in 2011, the HIV/AIDS and TB Control Programs operated as standalone national programs with PC-1s funded by the Federal Government. Till then, the latter supported provinces immensely in terms of strategic and normative guidance, setting standards with uniformity of practices, capacity building, resource mobilization from international agencies and donors, and monitoring and evaluation in addition to provision of logistics such as medicines and diagnostic materials, while program implementation remained the prime responsibility of the respective provincial programs.

1.2. TB Control in Pakistan

TB is one of the major public health problems in Pakistan, with the country ranking fifth among TB high-burden countries worldwide. The WHO-recommended DOTS strategy was piloted in 1995 in Pakistan. Major progress towards TB control, however, was achieved after the revival of the National TB Control Programme in 2001 when TB was declared a national public health emergency through the "Islamabad Declaration". TB control Programme has treated nearly 4 million people with quality assured drugs since its revival while maintaining the treatment success rate of more than 90%. Although steady progress has been made from 2001 to improve case detection, TB continues to be a major public health problem.

The country developed National and Provincial Strategic Plans (2017-2020) in the perspective of devolution and W.HO End TB Strategy. It is the country's strategic guide and national response to the tuberculosis (TB) epidemic for the next four years. It addresses the drivers of

the epidemic and builds on the achievements of the previous plans. Best practice and new evidence-based interventions will be scaled up and implemented while ensuring a high quality of service delivery. The NSP will be continually reviewed for relevance and effectiveness and, when necessary, adjustments will be made. It is a framework that will guide the activities of all stakeholders including the national government, provincial, regional and district governments, development partners, civil society, international agencies, research institutions, and private sector who all work together to eliminate TB in Pakistan.

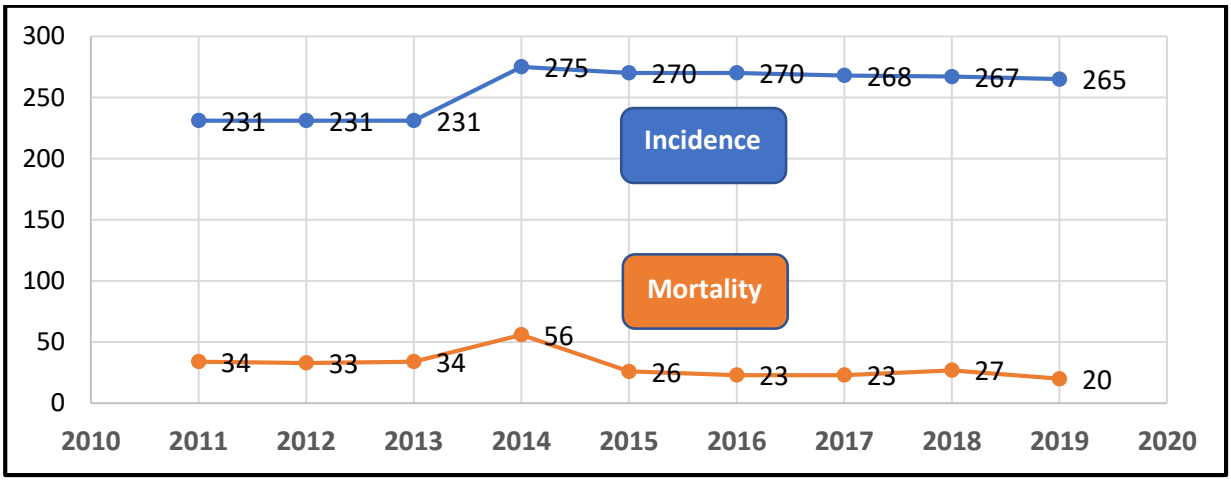
The strategic plans, therefore, aim to inform national, provincial, district, and community stakeholders on strategic directions that should be considered when developing implementation plans. It will make TB control visible in the health agenda and will advocate for substantial resources from the federal and provincial governments. It is the pathway to reaching the World Health Organisation's (WHO) END TB targets, and is aligned with the broader development plans of government. These include the Vision 2015 of One Nation, One Vision, Pakistan 2025, and Pakistan Post 2015 Development Framework.

1.3. TB Epidemiology

Basically, TB epidemiology and disease burden is determined by the impact indicators viz; TB prevalence, incidence and mortality till 2015 during the era of W.H.O Stop TB Strategy in the backdrop of MDGs. TB disease burden was based on nationwide prevalence survey (2010-11) (4) and Drug resistance survey (2012-13) (5). However, from 2016, W.H.O shifted to the End TB Strategy envisaging the SDGs and hence shifted to two indicators, viz; Incidence and Mortality to estimate the disease burden.

According to Global TB Report 2019 (TB data of 2018), Pakistan ranks 5th among 30 high-burden countries for TB and 5th for Drug Resistant TB (DRTB). and population census 2017. According to the W.H.O Global TB Report 2019 (TB data of year 2018), the estimated TB incidence and mortality remained at 265 and 340/100K respectively with an estimated burden of 562,000 new TB cases.

FIGURE 2. TB incidence and mortality trends in Pakistan over the years



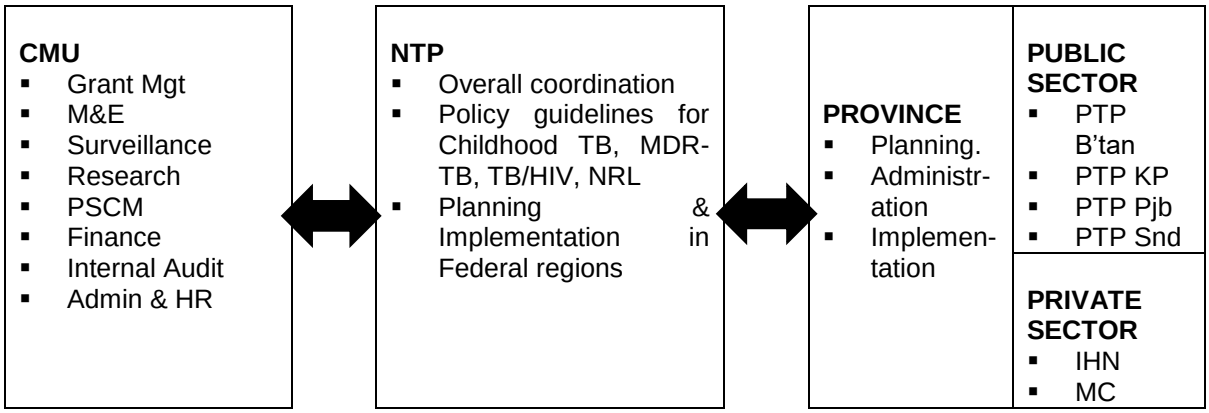
TB incidence shows an upward annual trend over the past decade from 231 to 265/100,000 while mortality due to TB showed a decline from 34 to 20/100000 to during the same ast decade and currently is at 20 deaths per 100K population (2018) (6).

1.4. TB Case Management

TB care services have a widespread perspective and have various dimensions for segregation purposes. The TB care facilities are called Basic Management Unit (BMU), may it be in private sector or public sector.

- TB care in Public sector. This includes all levels of care (primary, secondary and tertiary) facilities in public sector across the country. TB care services (both diagnostic and treatment) are provided ***free of cost*** in these facilities.
- TB care in Private sector includes different intervention/models of care in Pakistan ranging from PPM-1-4 (GP clinics, NGO based facilities, Private Hospitals and facilities in non-health public sector respectively). TB care services are provided at the minimal cost to be borne by the facility as well as the support from the Global Fund in terms of diagnosis and treatment.

FIGURE 3. Organizational chart (structure & functions) TB control in Pakistan



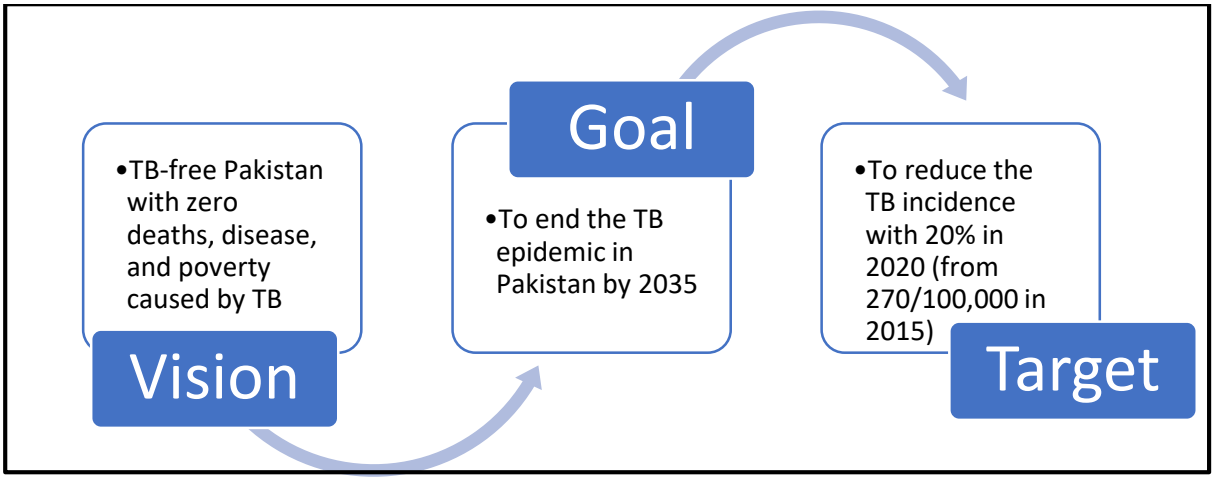
Most of the TB funding is provided by the GF, Despite the availability of free anti-TB drugs, patients struggle with out-of-pocket payments with catastrophic consequences and great income loss. Public health spending provides an important insight on a country's health progress, if efficiently used. The resources in terms of finances as well as commodities/products are distributed through the implementing partners. A significant portion of the budget (~80%) has been allocated to purchase of first and second-line anti-TB drugs, up-gradation/equipment and social/food support, which are being managed by the PR as per GF Guidelines.

TABLE 1. TB care services on the basis of implementation arrangements based on Global Fund support

Coverage	**Public Sector Principal Recipient (PR)**	**Private sector Principal Recipient (PR)**	
	NTP Pakistan	**Mercy Corps (MC)**	**The Indus Health Network (IHN)**
Sub Recipients (SRs)	▪ Punjab ▪ Sindh ▪ KP (+FATA) ▪ Balochistan *(Note: NTP was implementing entity for ICT, AJ&K and GB)*	▪ ASD, PLYC, MC_PIU(Punjab) ▪ BCF, PLYC (Sindh) ▪ ACD, MALC (KP) ▪ MC Quetta, SPO (Balochistan) ▪ MALC (AJK, GB) ▪ ASD (ICT)	▪ Green star Social marketing (GSM) ▪ Community Health Solutions (CHS)

Geographical spread	▪ Punjab ▪ KP ▪ Balochistan ▪ Sindh ▪ AJ&K ▪ ICT ▪ GB	▪ Punjab ▪ KP ▪ Balochistan ▪ AJ&K ▪ ICT ▪ GB	▪ Sindh ▪ Balochistan ▪ KP ▪ GB
# of district involved	All districts	66	35
TB Components implemented	▪ DS TB ▪ DR TB ▪ TB/HIV	▪ DS TB ▪ DR TB	▪ DS TB ▪ DR TB

1.5. National TB Control Program (NTP):



The World Health Assembly, passed a resolution in May 2014 approving with full support the new post-2015 Global TB Strategy with its ambitious targets. The strategy aims to end the global TB epidemic, with targets to reduce TB deaths by 95% and to cut new cases by 90% between 2015 and 2035, and to ensure that no family is burdened with catastrophic expenses due to TB. It sets interim milestones for 2020. TB data is analyzed annually on the following 10 indicators based on the End TB Strategy.

TABLE 2. Top 10 indicators - the End TB Strategy*

S.#	Indicator	Baseline (2015)	2019
1b	TB treatment coverage of drug-resistant TB (DR-TB)	20%	50%
2a	TB treatment success rate DS-TB	93%	93%
2b	TB treatment success rate DR-TB	69%	78%
3	% of households that experience catastrophic costs due to TB	NA	
4	% of new and relapse TB patients tested using WRD	NA	50%
5	Latent TB Infection (LTBI) treatment coverage	NA	35%
6	Contact investigation coverage	NA	45%
7a	Drug susceptibility testing (DST) coverage for TB patients (new cases)	1%	35%
7b	DST coverage for TB patients (previously treated)	84%	90%
8	Treatment coverage, new TB drugs	NA	40%
9	Documentation of HIV status among TB patients	4%	40%
10	Case fatality ratio (CFR)	9%	<5%

**Source: NSP 2017-2020*

National TB control program (NTP) revived subsequent to declaration of TB as national emergency by the Government of Pakistan in 2001. After devolution vide 18th constitutional amendment in July 2011, NTP was placed under the Ministry of National Health Services Regulations & Coordination. NTP in collaboration with all provincial/regional TB Programs, integrated with primary healthcare system, has made visible progress towards the containment of the TB care and control activities in the country since its inception in 2001.
Public Private partnership is gradually expanding to provide TB care services for both drug sensitive and drug resistant TB in line with National Guidelines after 100% coverage of TB care facilities in public sector since 2005. Currently the private sector is contributing towards 20% of TB case notification in the country.

NTP acts as a collaborating body at the central level for development of uniform policies and strategies, facilitating the donor liaison at national level and responsible for national and international TB surveillance. NTP at this point in time is implementing Global Fund supported grant through a mechanism of New Funding Model (NFM) as Principal Recipient. However, sustaining the role of NTP as centralized institutional entity in post devolution context for uniformity in policies, donor liaison, advocacy and backup technical assistance to PTPs still remains a challenge in the backdrop of re-defined roles and responsibilities vis-à-vis Enhanced Provincial Commitments in devolved setup.

1.6. The Indus Health Network (IHN):

The Indus Health Network is the principal recipients for TB control in Pakistan. It operates along with its two Sub-recipients (SRs) viz; Grenstar Social marketing (GSM) and The Community Health Solutions (CHS) across the country with following initiatives/interventions;

TABLE 3. Key innovation and interventions for TB care and control by IHN during 2019

Initiative	Intervention
SEARCH	**Active case finding:** Systematic screening with digital x-rays & automated chest radiography followed by Xpert testing amongst at-risk population
	Child TB: Active screening of children in pediatric OPDs
	GPs: Facilitating private sector providers to better diagnose and notify cases under treatment in the private sector
TREAT	▪ Linking newly identified patients to **existing TB care sites** (public & private) ▪ Increasing capacity to manage, identify early on and treat **DRTB** patients ▪ **Child TB**: Dedicated teams for treatment of children with TB ▪ **GPs**: Facilitating private sector providers to better diagnose and notify cases under treatment in the private sector
PREVENT	▪ **Contact tracing and post exposure therapy:** Active case finding amongst household contacts of TB patients and others at risk, and post exposure therapy to tackle TB infection ▪ **Infection prevention:** ▪ Environmental changes in clinics to improve infection risk, education of families, and UVGI light installation

1.6.1. Innovative Approaches – 2019

- 8 Targeted community-based Mega screening camps conducted in Karachi, as an intensive active case finding approach in high-burden areas of the city
- Community-based contact screening camps of DS & DR-TB patients in several districts of Sindh & KP
- Extensive Active Case Finding camps conducted across rural Balochistan
- Screening & Preventive Treatment of high-risk groups (prisoners, HIV patients & Immunocompromised patients) in Sindh, Balochistan & KP

1.6.2. Drug Susceptible (DS) TB:

- 62,476 Drug Sensitive TB Cases Notified
- 10,379 Childhood TB cases Notified
- 9,513 TB cases Found through x-ray Van Camps
- 1,150 Drug Resistant TB cases Enrolled for Treatment
- 66% DR TB Cases Successfully Treated
- 51 Prison Inmates Diagnosed and Put on TB treatment
- 12,959 Prison Inmates Put on Preventive Therapy
- 9,428 Household Contacts Put on Preventive Therapy
- 116 Children and Adolescent Put on Preventive Therapy

1.6.3. Active Case Finding - Mega Screening Camps Karachi:

Eight Mega Screening Camps held in different locations across Karachi. Camps were held on weekends to ensure presence of all household members including working males. Camp locations were selected based on hot-spot mapping to identify high-burden communities. Each camp was an intensive full-day activity engaging multiple mobile x-ray vans in a pre-defined radius conducting over 1000 screens in a day.

- 5,944 Patients screened on X-ray
- 400 Sputum samples collected for GeneXpert
- 31 Diagnosed with TB
- 30 Bacteriologically confirmed cases

1.6.4. Active Case Finding in Rural Balochistan:

- *5,728 Patients screened on X-ray*
- *916 Sputum samples collected for Gene Xpert testing*
- *182 Diagnosed with TB*
- *107 Bacteriologically confirmed cases*

1.6.5. Community- Based Contact Screening Camps:

- >30 contact screening camps conducted over 3 months
- >1,500 contacts evaluated for TB
- 786 contacts started on Preventive Treatment

TABLE 4. Program management of drug resistant TB (11 PMDT sites in sindh and Baluchistan)

Intervention	Activities
Clinical Services for DR TB:	▪ Formation of Care Teams – multidisciplinary management of patient & team work ▪ Clinical Review Committees – access to expert panel for patient management cent
Clinical Monitoring Planning	▪ Clinical Review Meetings ▪ High risk patient monitoring through Care Team meetings ▪ Online monitoring sheets
Capacity Building of Employees:	▪ NTP latest guidelines - Doctors & Pharmacists ▪ CXR reading - Doctors ▪ Counselling Services for Management of MDR TB - TCS & Counselors ▪ Contact screening algorithms ▪ ADSM onsite training ▪ Staff trainings on New Drugs
Social Support Disbursement Plan:	▪ Training of key staff on opening of Easypaisa mobile wallets ▪ Monitoring of monthly account opening per site ▪ Active discussion with sites on issues raised and problem solving ▪ Inaccurate data validation/data updates- phone numbers, NIC
Implementation of QA Standards:	▪ Standardization of care across Indus run PMDT sites ▪ Focus on

	- Sputum quality & transportation - Patient management - Infection control measures - Data quality
Field Services	▪ Close monitoring of monthly 1st & 2nd Missed follow ups to minimize LTFU cases. ▪ Counsellors and Doctors involvement in Field retrieval efforts according to revised field protocols ▪ Documented communication with PTP & DTCs for patient retrieval efforts
Field Services & Outreach	▪ Reassessing resource allocation: Addition of cars to Hyderabad and Sukkur region ▪ Contact screening camps has been initiated at Hyderabad, Sukkur and Balochistan region according to updated protocols ▪ Formation of regional committees for field monitoring ▪ RR Detection monitoring still an issue due to unavailability of data from GeneXpert sites
Contact Screening Efforts	▪ Extensive work being done on LTFU in Karachi and catchment of all other sites ▪ X-ray vans being used to carry out contact screening in villages where DR patients live (Hyderabad region, Sukkur region, Baluchistan and Karachi)
Integration of ACF & PMDT for Screening Camps:	▪ Integration of ACF & PMDT for screening camps at ICD Kotri, Hyderabad & Sukkur ▪ Formulation of integrated algorithm with ACF Team on process of Contact screening, monitoring sputum samples, follow up of GeneXpert results to directly increase case detections. ▪ Training of staff for improved data collection on Open MRS forms

1.6.6. Portfolio Optimization:

Additional funds were granted to The Indus Hospital during 2019 under Portfolio Optimization with a purpose to maximize results from the PPM Model interventions being implemented by its SRs (CHS and GSM) to capture missing cases in their operating districts. This has enabled TIH to scale up engagement of private providers and laboratories in many districts across the country including those that are further away in 'tehsils' outside of district capitals. Capacity building of GPs on TB services along with inclusion of pulmonologists and pediatric specialists for evaluating the difficult to diagnose extrapulmonary and child presumptive cases along with active and enhanced case finding through community mobilization, mobile X-ray van screening camps and enhanced GeneXpert testing has ensured increased TB notification in these districts.

1.7. Mercy Corps (MC):

Mercy Corps is the principal recipient of Global Fund grant for TB since 2007. Currently Mercy Corps as PPM partner, is operating in 66 district of Pakistan (including Punjab, KP, Balochistan, AJ&K, ICT and GB) and implementing the Global fund grant through its 6 sub recipients.

TABLE 5. Interventions/activities by MC during 2019

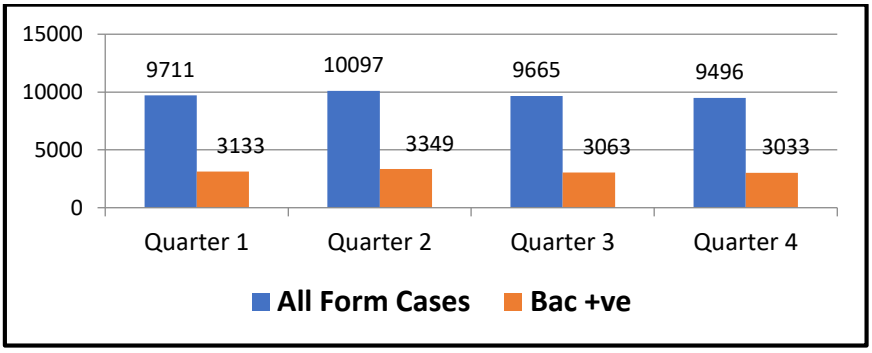
Intervention	Activities
Engagement of private healthcare providers and labs	▪ Mapping to identify potential GPs and Labs ▪ Training of selected GPs and Labs on standardized TB management guidelines ▪ Provision of ATT drugs and Lab reagents through PTP ▪ 4. Monitoring and supportive supervision of partners, DTCs
Active case finding	▪ Community gatherings ▪ Engagement of Lady Health Workers for verbal and contact screening, identifying presumptive cases and referral to

	public or private health facilities ▪ Conventional chest camps ▪ Mobile screening camps with digital x-rays and Gene Xpert
Enhanced case finding	▪ TB screeners in large private hospitals

1.7.1. TB patient contribution (all Forms and B+) through GP Model:

GP model is implemented in 66 districts of all four provinces and two regions namely AKJ and GB through six SRs involving1716 GP clinics under PPM-1. A total of 38,969 cases (all forms) and 12,578 B+ cases have been registered during the year 2019, with a treatment success rate of 90%.

FIGURE 4. Contribution of case notification (by quarter) during 2019



1.7.2. Chest Camps:

For active case detection, Mercy Corps has been conducting conventional chest camps in 46 districts, preceded by community gatherings. A total of 455 chest camps have been organized in 2019 through which 869 all form TB cases were registered.

In addition, 666 camps were conducted using mobile vans in 19 program districts. Out of seven vans 4 are equipped with Xpert machine while all of the vans have digital X-ray facility. A total of 1624 all forms cases were registered in Sindh Province through this intervention during the reporting period, with an average yield of 2.4 cases per camp.

1.7.3. Enhanced Case Finding:

This intervention is implemented through 15 large private hospitals distributed among six districts of Punjab. Each hospital is provided with diagnostic tools for TB like Gene Xpert machines and LED microscopes along with a trained Lab technician for testing. In addition, a TB screener is posted at each hospital for screening all the patients coming to the OPD for any signs/symptoms of TB and refer all presumptive TB cases to the trained physician of the same hospital for further examination and diagnosis. A total 1,766 all forms cases were registered through these hospitals, with an average yield of 117.7 cases per year per hospital.

1.7.4. Rifampicin Resistant Cases:

A total of 208 RR cases were identified during the year 2019.

1.7.5. Cases Contributed by Lady Health Workers:

LHW component is being implemented in only 2 districts; Umerkot and Sanghar of Sindh. With the help of 565 trained LHWs, a total of 1,193 all forms cases were registered through this intervention in the year 2019.

1.7.6. Other Achievements:

1. *Portfolio Optimization:* It was Mercy Corps' effective, innovative and transparent implementation of TB control activities which led to winning of an additional funding under portfolio optimization. Through this additional grant MC was not only able to expand its PPM GP model in all four provinces of Pakistan by increasing number of GPs & Labs but also included pharmacies for referrals of presumptive TB cases. This helped in early diagnosis and better management of such cases. In addition, this intervention is expected to help in early diagnosis and finding missing TB cases in the communities.
2. *Technical support in revision of national TB guidelines:* Mercy Corps' team members were part of the group which actively participated in updating the national TB guidelines. This included revised national guidelines as well as other modules like PPM guidelines, Doctors, Para-medics and Lab technicians' training modules.
3. *Selection of LHWs Case study by WHO for publication and wide spread dissemination:* WHO circulated an offer to participate in a competitive procedure through which certain success stories from field could be used for wider dissemination for the purpose of awareness and lessons learned. Mercy Corps' case study from its LHW component is selected for this purpose and will be shared with Global TB community after publication.
4. *Collaboration with NTP and KIT research institute on digitalization of field activities data:* With the help of NTP and KIT tropical institute, a Dutch research institute, a project was started to digitize all field activity data through DHIS II. This will provide real time information about case registration as well as will be able to identify high prevalence areas, so that future field activities could be planned accordingly. Field staff has already been trained and provided with required equipment and is intervention is being field tested.
5. *Collaboration with Epcon on sustainable solution for computer aided X-ray readings to screen for TB:* To find a cost effective and sustainable alternative for CAD4TB, Epcon research institute was contacted and another computer aided TB diagnostic software CAD4GOOD is being tested for feasibility as an alternative to CAD4TB.

Among the challenges remains, the Implementation of Mandatory TB notification act, lack of sputum transportation system and low number of field staff.

CHAPTER 2. POLICING AND STRATEGISING FOR TB CONTROL

TB care in Pakistan can be broadly segregated into following components;

A. TB Treatment (curative) services, which is further bifurcated as under;
   - Drug Susceptible (DS) TB
   - Drug Resistant (DR) TB
   - TBHIV Co-infection

B. TB Preventive services (LTBI)

The TB policy and strategy unit is responsible to provide strategic and policy guidance to the provinces and technical support in all areas of TB care including drug susceptible TB, Drug resistance, TB/HIV, PPM, Childhood TB. The unit also implements these activities for TB control in three regions of AJK, GB and ICT. The unit also provides technical guidance for implementation of following pilot projects;

1. Mandatory TB case notification" supported by the Global Fund grant in five districts of two provinces.
2. The Multi-country Grant of Global Fund" is meant for 21 refugee villages of two provinces viz; KP & Baluchistan.

2.1. Drug Susceptible TB

DS-TB is managed at Basic Management Units (BMU) in both public and private sector across the country. Every BMU is equipped with both diagnostic and treatment facilities (staff trained in TB case management, ATT drugs and equipment/instrument) facilities in Pakistan. Recommended average population coverage at a typical BMU in public sector is about 100,000 but in Pakistan, it varies grossly according to population density in different provinces.

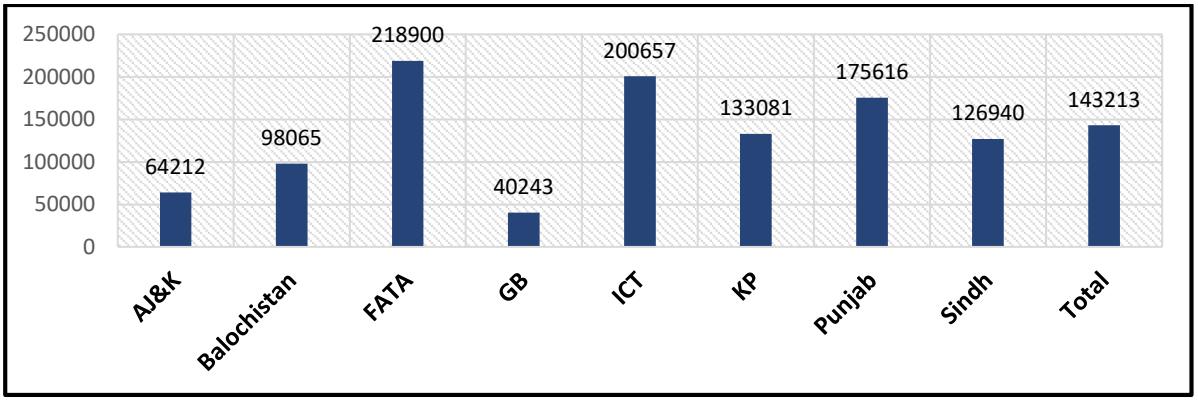
TABLE 6. BMUs in Pakistan by province/region during 2019

Province/ Region	Population	# Districts	Public Sector (BMUs)				Avg, Pop / BMU
			# RHCs / BHUs	# THQ / DHQ Hosp	# Tertiary Care Hosp	Total	
AJ&K	4,045,366	10	37	25	1	63	64,212
Balochistan	13,238,716	34	88	42	5	135	98,065
FATA	5,253,588	13	15	9	0	24	218,900
GB	1,408,498	7	30	5	0	35	40,243
ICT	2,006,572	1	7	0	3	10	200,657
KP	32,338,641	25	133	103	7	243	133,081
Punjab	114,852,929	36	484	155	15	654	175,616
Sindh	50,268,259	29	322	64	10	396	126,940
Total	223,412,569	**155**	**1116**	403	41	**1560**	143,213

The recommended population coverage per BMU is 100,000 for high burden countries like Pakistan. However, the average population coverage per BMU in public sector varies from 60,000 to 180,000 depending on the population density in different provinces and regions of

the country. The Punjab has maximum population density whereas regions have the least population coverage per BMU.

FIGURE 5. Average population per BMU by province in Pakistan during 2019

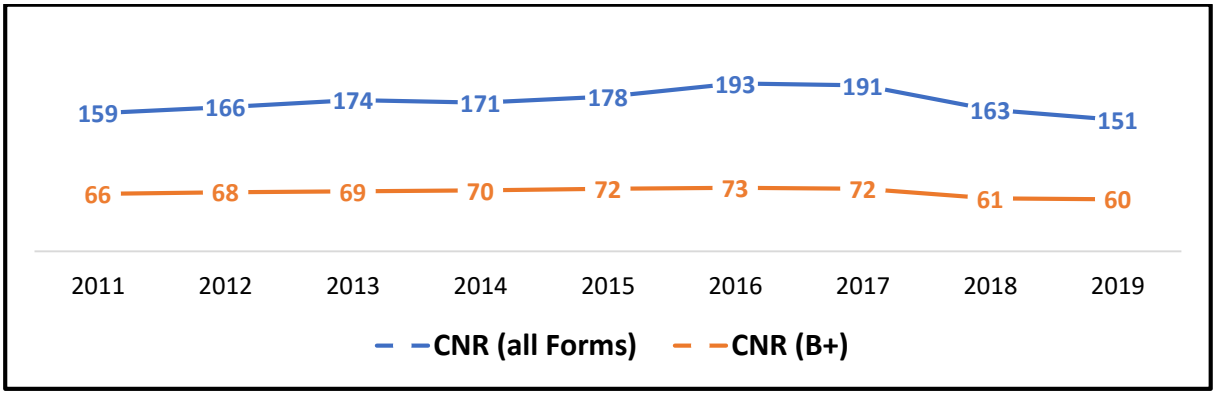


FATA region has most population per BMU while GB region has the least population covered by a BMU. Both the regions have low population density whereas Punjab is the most thickly populated province with an average population coverage of about 175000 per BMU. However, on average the country has a population coverage of 143213 showing that an average BMU is optimally covered by recommended population in Pakistan.

2.1.1. Treatment Coverage DS-TB:

TB case notification also varies in different provinces and regions according to the TB caseload and extent of TB case management practices which in turn depend on different enablers, inter alia, the healthcare infrastructure, availability of resources, level of monitoring and supervision and ownership of the health management teams. The DS-TB case notification is depicted in the table below.

FIGURE 6. Trend of DS-TB Case Notification over the years

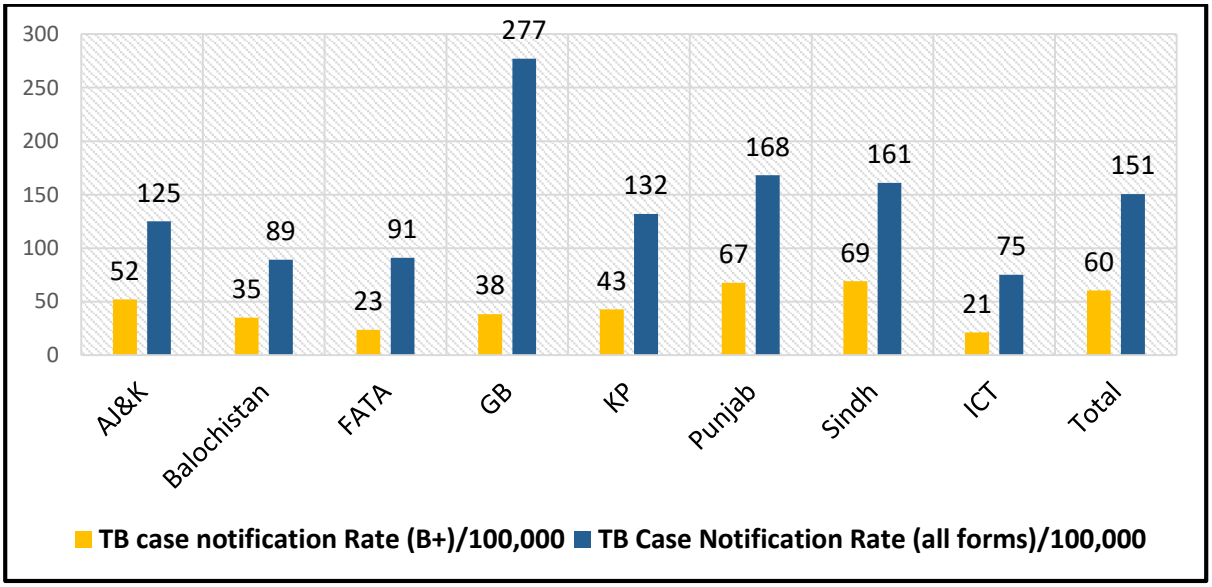


A total of 327969 TB incident (N+R) cases were notified in the country during 2019 among whom 131715 (39%) were B+ TB cases. However, as shown in figure above, the DS-TB case notification is showing a persistent decline since 2016 and hence could not achieve the acceptable target of the End TB Strategy (154/100,00) during 2019, thus putting a question mark on the policy makers, managers and implementers regarding the TB case management practices in Pakistan.

TABLE 7. TB case notification by province during 2019

Province / Region	Population	# of TB cases notified (B+)	TB case notification Rate (B+)/100,000	# of TB cases notified (all forms)	TB Case Notification Rate (all forms)/100,000
AJ&K	4,142,455	2150	52	5,100	125
Balochistan	12,640,674	4402	35	11,085	89
FATA	5,121,716	1199	23	4,440	91
GB	944,851	362	38	2,614	277
KP	31,255,932	13357	43	40,881	132
Punjab	112,652,741	76020	67	187,658	168
Sindh	49,035,316	33793	69	74,695	161
ICT	2,054,730	432	21	1,496	75
Total	**217,848,415**	**131715**	**60**	**327,969**	**151**

FIGURE 7. DS-TB Case Notification Rate (CNR) in Pakistan (by province/region) during 2019



Among the provinces and regions of the country, GB region showed and extraordinary increase in case notification followed by Punjab and Sindh provinces as usual while TB case notification remained at the lowest ebb FATA ICT and Balochistan. The proportion of B+ to all forms was best in the province of Sindh and poorest in GB region.

2.1.2. Treatment Outcome:

Treatment Success Rates (both all forms & B+) were achieve and crossed the acceptable target of ≥90% during 2019 at country level. There is an improvement in case holding practices during the last five years. However, an imbalance or mismatch between case finding and case holding practices remains a question from public health aspect and yet to be explored.

TABLE 8. Treatment outcome of DS-TB cohort 2018 in Pakistan

Indicator	Cases registered in 2018	Cured or Treatment completed	Treatment failed	Died	Lost to follow up	Not evaluated
DS TB cases (all forms)	369136	332281 (93%)	1730 (0.5%)	6596 (2%)	11784 (3%)	5502 (1.5%)
Previously treated (excluding Relapse)	9263	7605 (82%)	127 (1%)	325 (4%)	776 (8%)	430 (5%)
HIV+ among all type cases	307	156 (51%)	1 (0%)	32 (10%)	98 (32%)	20 (7%)

TABLE 9. Treatment outcome of DS-TB cohort 2018 (all forms) by province

	# cases in notified 2018	TREATMENT OUTCOMES ALL FORMS							
		Cured	Treatment Completed	Treatment Failed	Died	Lost to follow up	Not Evaluated	Moved to 2nd Line register	Net Evaluated
AJ&K	5,193	1,789	3,047	8	237	19	77	16	5,177
Balochistan	10,312	2,854	6,268	58	231	650	232	19	10,293
FATA	4,691	1,059	3,364	62	75	67	45	19	4,672
GB	2,918	318	2,550	2	12	33	3	0	2,918
KPK	43,603	10,487	31,219	199	535	704	414	45	43,558
Punjab	220,770	56,233	146,571	930	3,769	6,458	3,496	912	217,457
Sindh	79,980	21,016	49,028	603	2,023	4,468	1,592	1,250	78,730
ICT	1,669	183	1,138	2	63	192	87	4	1,665
Pakistan	369,136	93,939	243,185	1,864	6,945	12,591	5,946	2,265	364,470

TABLE 10. Treatment outcome B+ (N+R) by province during 2019

	No. of cases notified in 2018	TREATMENT OUTCOMES B+ (N+R)						Moved to Second line register	Net evaluated
		Cured	Treatment Completed	Treatment Failed	Died	Lost to follow up	Not Evaluated		
AJ&K	2,031	1,783	109	7	86	8	26	12	2,019
Balochistan	3,882	2,771	574	30	119	236	133	19	3,863
FATA	1,243	1,022	58	43	48	29	28	15	1,228
GB	335	318	9	2	6	0	0	0	335
KPK	13,634	10,334	2,294	155	293	268	251	39	13,595
Punjab	84,575	55,329	22,087	590	1,775	1,997	1,728	156	83,506

Sindh	32,375	19,359	8,019	504	1,023	1,839	747	884	31,491
ICT	502	183	255	2	11	33	15	3	499
PAKISTAN	138,577	91,099	33,405	1,333	3,361	4,410	2,928	1,128	136,536

FIGURE 8. Treatment success rate DS-TB Cohort 2018 by province/region

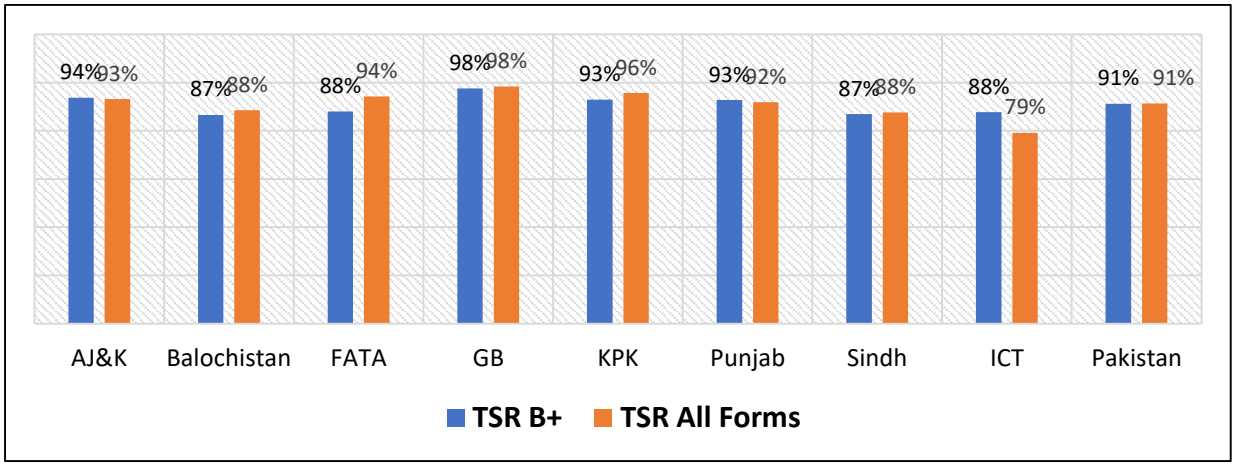
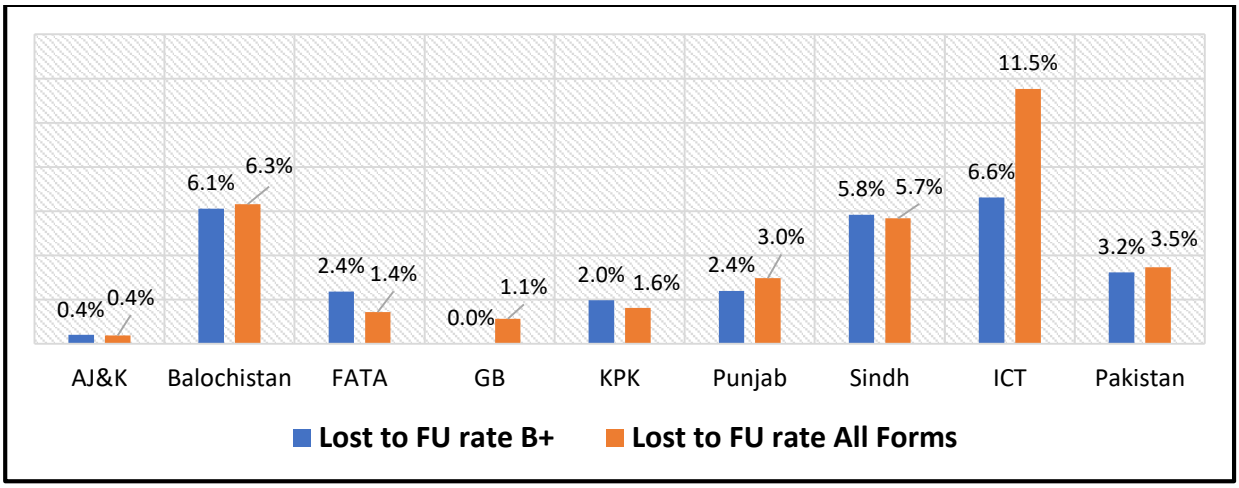


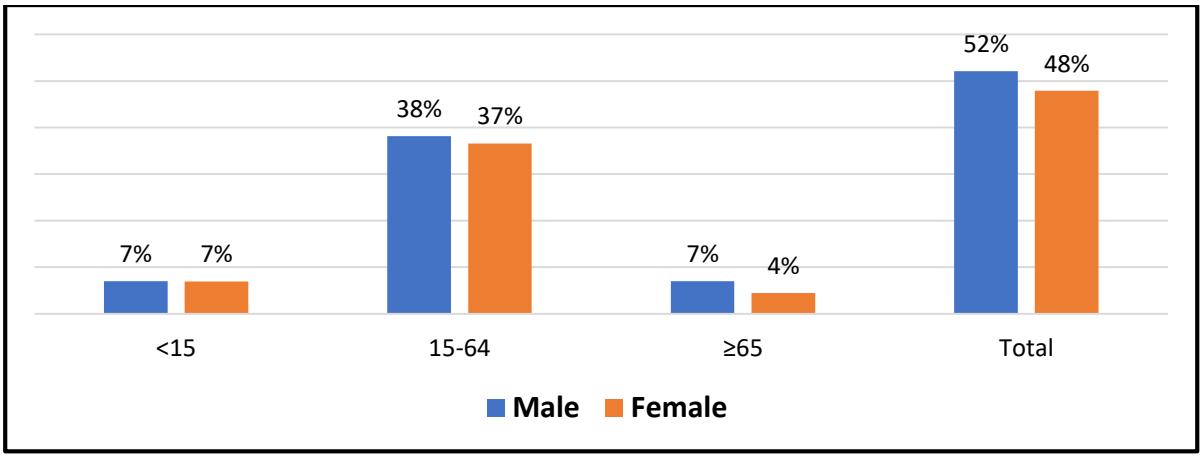
FIGURE 9. Lost to follow up rate (all forms) DS-TB Cohort 2018 by province/region



The province of Balochistan, Sindh and ICT regions showed an increased lost to follow up rate beyond the acceptable target of ≤5% while AK&K, FATA, GB and Punjab achieved the minimum target for this indicator.

2.1.3. Age and Gender Distribution:

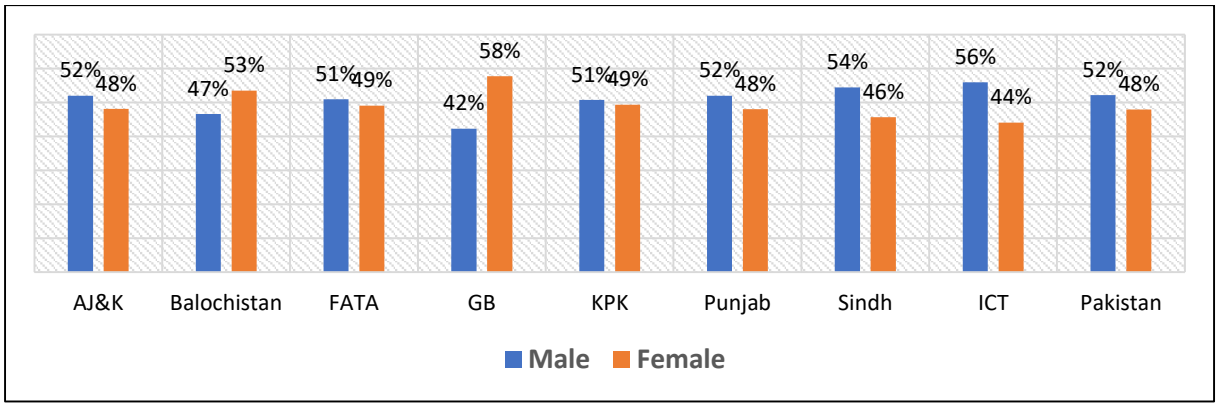
FIGURE 10. Age and gender distribution of DS-TB patients (all forms) notified in 2019



Male to female ration is higher in all age groups except among <15 age group where it is equal (1:1). The overall male to female ratio is 1.08.

By province/region, the lowest male to female ratio among TB cases notified during 2019 was recorded in Balochistan and GB whereas it remained high in the rest of the provinces and at the country level.

FIGURE 11. Proportion of male to female TB case notification (by province/region) during 2019



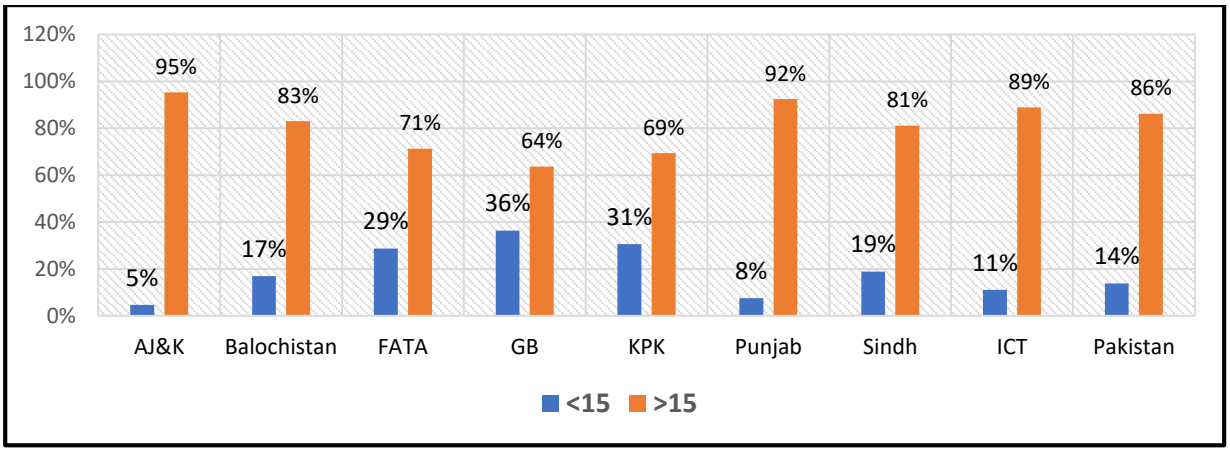
2.2. Childhood TB

NTP follows the WHO Roadmap towards ending TB in children and adolescents and with the aim of reaching the United Nations High Level Meeting (UNHLM) TB targets. Children 0-14 years comprise about 35% of Pakistan's population. There has been a marked and steady increase in TB case notifications among children due to private sector engagement in 2012 and the development and dissemination of national child TB guidelines development, with health care worker training based on the guidelines.

Pakistan reported 45447 cases of TB in children in 2019 which is 14 % of the total TB case notification and is consistent with what is expected (10-20%) of a high TB burden country. The proportion of children with age group of 0-4 and 5-14 age group remained 41% and 59% respectively of total childhood TB cases notified which is higher among 0-4 age group than expected. Child TB notifications in 2019 showed marked variability among different provinces. Punjab and AJ&K reported the lowest number of children followed by ICT and Balochistan, which is surprising considering that Punjab province is home to 56% of Pakistan's population. This indicates a large detection gap in Punjab, estimated at over 6% of children with TB that

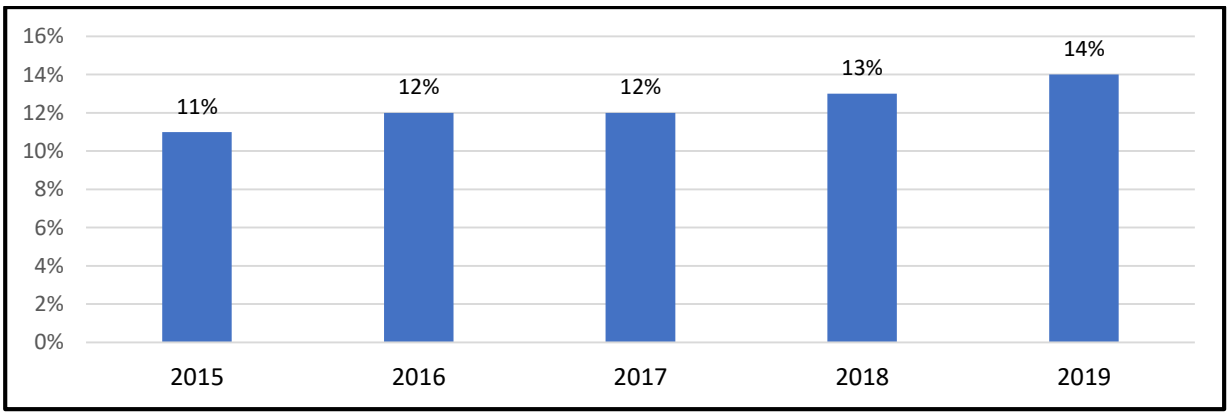
are missed. On the other extreme Gilgit-Baltistan stood out as the highest child TB reporting region in 2019 with nearly half the detected cases of child TB, which, based on projected estimates, is likely to represent over-diagnosis.

FIGURE 12. Proportion of childhood TB case notification (by province/region) during 2019



The following figure shows the overall trend of DS-TB case notification among children <15 has increased over the past five years.

FIGURE 13. Proportion of childhood TB case notification trend over time in Pakistan



2.3. Public Private Mix (PPM)

In Pakistan, an estimated 84% of initial healthcare seeking is estimated to take place in the private sector: 24% with informal providers and 61% with formal providers, especially GPs . Private healthcare providers include at least 100,000 GPs, over 67,000 pharmacies, thousands of laboratories, and around 5,000 hospitals. While they are concentrated in urban areas, GPs and informal providers also serve small towns in rural areas.

The private sector which has its stakes in TB control is much larger than perceived and not only limited to the health care providers only, a simple stake holder list includes NTP, PTPs, Technical Partners, implementing partners, Donors, philanthropists, pharmacists, chemists, insurance agencies, professional bodies, Researchers, large private hospitals, CBOs, community leaders, religious leaders, trade unions, chamber of commerce and media.

2.3.1. ***Contribution of the Private Sector***

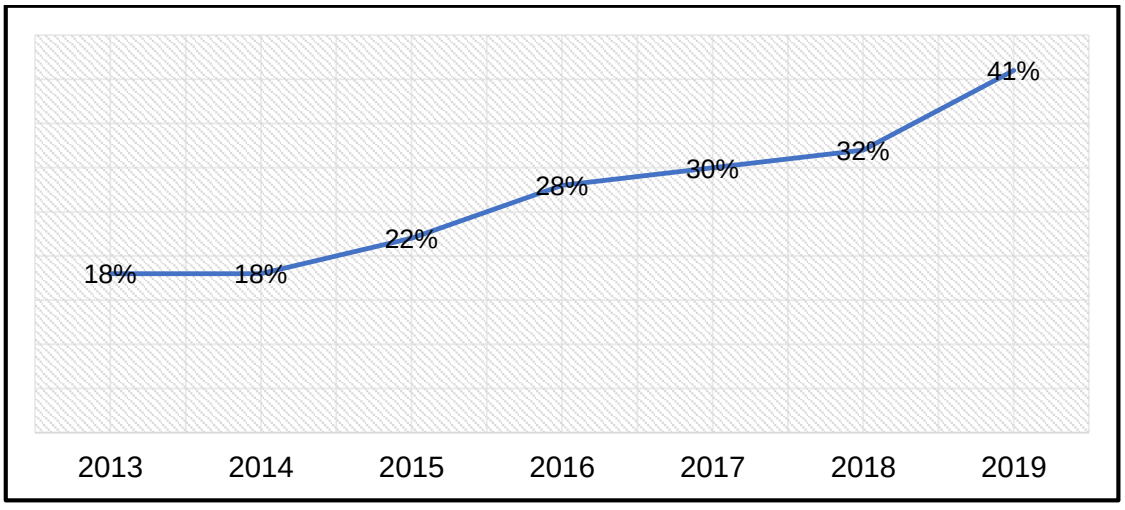
Most of the population has their first contact with a private provider for health care therefore, it is important to involve private practitioners in TB care services. Many private facilities, including solo private practitioners, private hospitals/clinics, NGOs, pharmacies, and informal practitioners are involved in the management of TB. Public-Private Mix (PPM) aims to establish linkages between private practitioners and the public sector to improve access and standardize TB care.

PPM intervention was formally initiated by NTP through the partners including Mercy Corps and Greenstar Social Marketing with the support of the Global Fund in 2012. Initially this intervention was limited to the TB case notification by GP clinics however with the encouraging contribution in TB case notification by private sector, his intervention was gradually scaled up and sustained among all types of providers in private sector.

Currently, there are four main models of PPM in Pakistan: PPM1 for GPs, PPM2 for NGOs, PPM3 for private hospitals, and PPM4 for parastatal or other public hospitals. More than 2000 GPs attached with 438 private labs, 122 NGO networks, 35 private hospitals and 33 parastatal hospitals including 15 armed forces health are involved in TB case management as per national TB guidelines in the country.

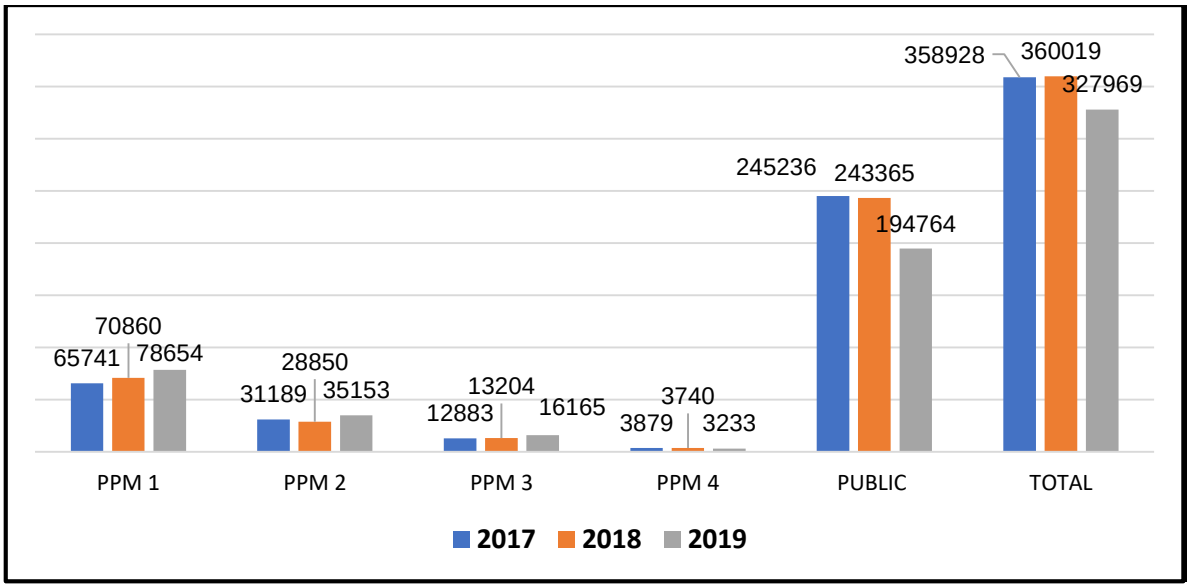
The proportion of TB case notifications from PPM has been doubled from 20% (in 2013) to 41% (in 2019) as expressed in the figure below.

FIGURE 14. Scale up of PPM case contribution in Pakistan



During 2019, 133205 TB cases (41%) were contributed from all PPM models among total 327969 TB cases notified during the same year. Among the private sector, the case contribution by PPM models remained highest in PPM-1 (59%) and lowest in PPM-4 (2%) whereas PPM-2 &3 case contribution was 26% and 12% respectively.

FIGURE 15. Comparative analysis of private v/s public sector TB case notification (all forms) 2017-2019

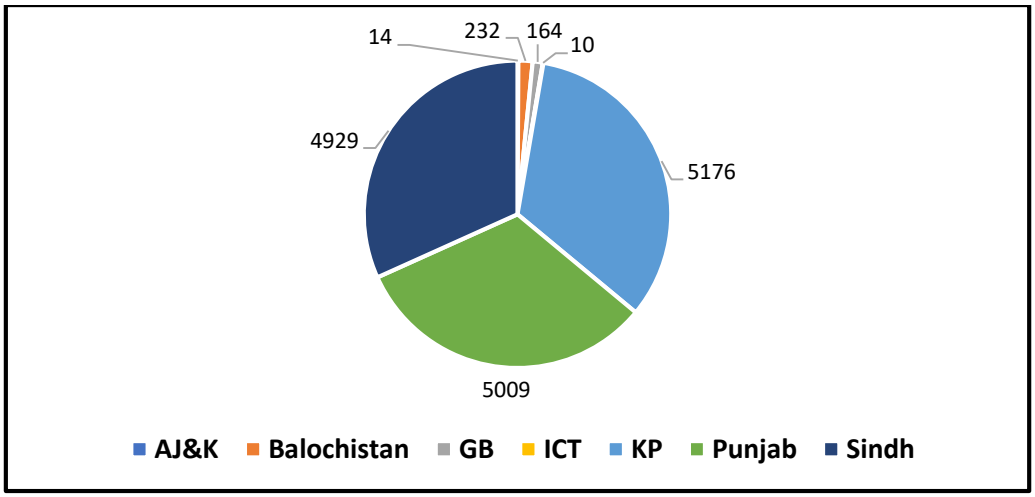


The above figure shows that among all four models of PPM, number of TB case notification (all forms) increased in all PPM models over the last three years except PPM-4 where this number declined. The figure also shows that the public sector gradually got compressed in terms of TB case notification over the last three years, thus widening the gap between private and public sector for TB case notification.

TABLE 11. TB case notification (by province/region) during 2019

Province /Region	Estimated cases	Notified cases (all forms)	Public sector	Private sector	CDR	CNR	PPM contribution
Punjab	298,530	187658	111597	76061	**64%**	168	**41%**
Sindh	129,944	74695	37462	37233	**61%**	161	**50%**
KP & FATA	96,401	45321	30811	14510	**47%**	223	**32%**
Balochistan	33,498	11085	7257	3828	**33%**	89	**35%**
AJ&K	10,978	5100	4354	746	**47%**	125	**15%**
GB	2,504	2614	2138	476	**105%**	277	**18%**
ICT	5,445	1496	1145	351	**28%**	75	**23%**
PAKISTAN	**577300**	**327969**	**194764**	**133205**	**58%**	154	**41%**

FIGURE 16. Childhood (<15) PPM TB case contribution (by province/region) during 2019



A total of 15534 childhood TB cases were notified by the private sector during 2019 among which the province of KP contributed maximum number of childhood TB cases (5176) followed by Punjab (5009) and Sindh (4929) which is very strange as the KP public sector contribution (both adult and childhood TB) as well as population is the lowest as compared to Punjab and Sindh.

2.4. Missed TB Cases

Contrary to global and regional trends, Pakistan's TB case detection rate stagnated in 2016, and started declining in 2019. More than 200,000 (45%) of the estimated incident TB cases were not detected in the country during 2019, despite the Global Fund financing innovative interventions targeting these cases. This is due in part to active TB case detection interventions focusing on urban areas, whereas 63% of the population live in rural areas. The private sector, where most of the population seek general health services, has little involvement in TB case notification; only 5% of general practitioners from the private sector report TB cases4. The public sector does not perform active TB case finding, with limited contact tracing and screening for TB in out-patient departments.

TB cases notified by each province and region are shown in diagram below and percentage contribution to the national TB Missing cases.

TABLE 12. Comparison of notified v/s missed TB cases among incident TB cases during 2019

	Punjab	Sindh	KP+FATA	Balochistan	AJ&K	GB	ICT	Pakistan
Incident (Est.) TB Cases*	304,360	133,211	99,619	35,083	10,720	3,733	5,317	592,043
Notified TB Cases	187,658	74,695	45,321	11,085	5,100	2614	1,496	327,969
Missed TB Cases	116,702	58,516	54,298	23,998	5,620	1,119	3,821	264,074
Missed (%)	38%	44%	55%	68%	52%	30%	72%	45%

**@265/100,000 as per W.H.O Global TB Report 2019*

FIGURE 17. Proportion of estimated missed TB cases

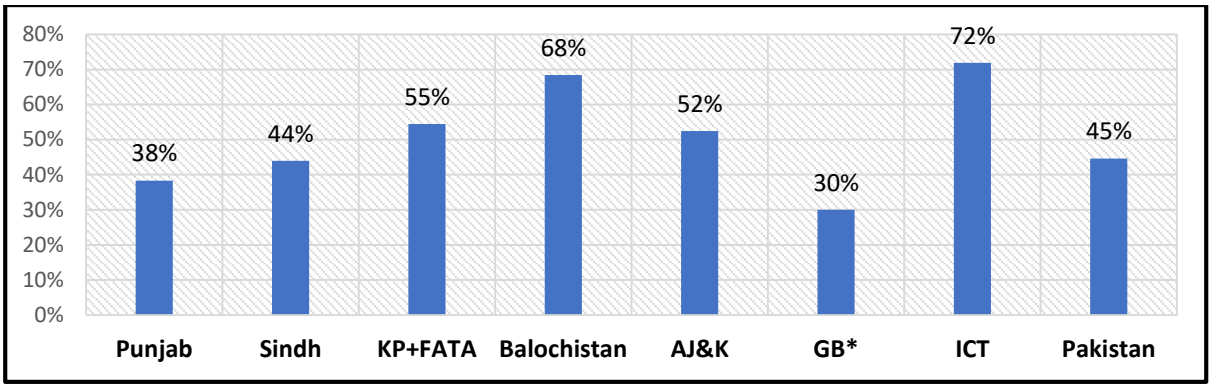


TABLE 13. Suggested reasons of missed TB cases in Pakistan

Public Sector	Private Sector	Community
▪ Low referral form different departments of same hospitals due to weak intra hospital linkages ▪ Heavy OPD tend to TB presumptive at large public sector hospitals ▪ Untrained staff in national TB guidelines at large hospitals due to rapid turnover ▪ Poor referral of TB presumptive from basic health units (BHU) in TB control	▪ Suboptimal engagement of private providers. Mostly urban private providers are engaged ▪ Non implementation of Mandatory TB Notification act. Approximately 164,000 TB cases are treated in private sector (IQVIA report 2020) which are not notified	▪ Around 1/3 of missed cases are a symptomatic which never seek care, neither from Public sector nor from private sector ▪ Delay in diagnosis ▪ The stigma attached to TB further delays the health seeking

2.5. Drug Resistant TB

Pakistan with an approximately 15,000 estimated drug resistant cases among total pulmonary notified cases every year and is ranked 4th among highest prevalent DRTB countries. It is estimated that 4.2% DRTB cases among new pulmonary and 16% DRTB cases among previously treated cases have DRTB. Main reasons behind DRTB include poor treatment adherence, use of unknown quality of medicine in private sector, diagnostic delays, unsupervised treatment, poor follow up and at DSTB level.

The programmatic management of Drug Resistant TB (PMDT) services were initiated in 2010 while full geographic coverage achieved by 2016 (33 PMDT sites) with concerted efforts of multiple stakeholders. Among 33 PMDT sites, 5 PMDT sites (IHK, RCH, RLP, GDH, DMC) are being operated in private sector (ASD, ACD, IHN) while 28 are in public sector facilities (PTP Punjab & PTP Sindh). All PMDT sites are also well equipped on the principles of TB infection control and prevention to achieve reduction in disease transmission.

FIGURE 18. Geographical spread of PMDT sites for DR-TB (by province) in Pakistan during 2019

TABLE 14. PMDT sites establishment (target v/s achieved) during 2016-2019

Indicator	Baseline (2015)	Yearly Target				Achievements by 2019
		2016	2017	2018	2019	
PMDT total sites	27	30	35	40	45	73%

FIGURE 19. Implementation arrangements of PMDT (by sit and by implementing partner) during 2019

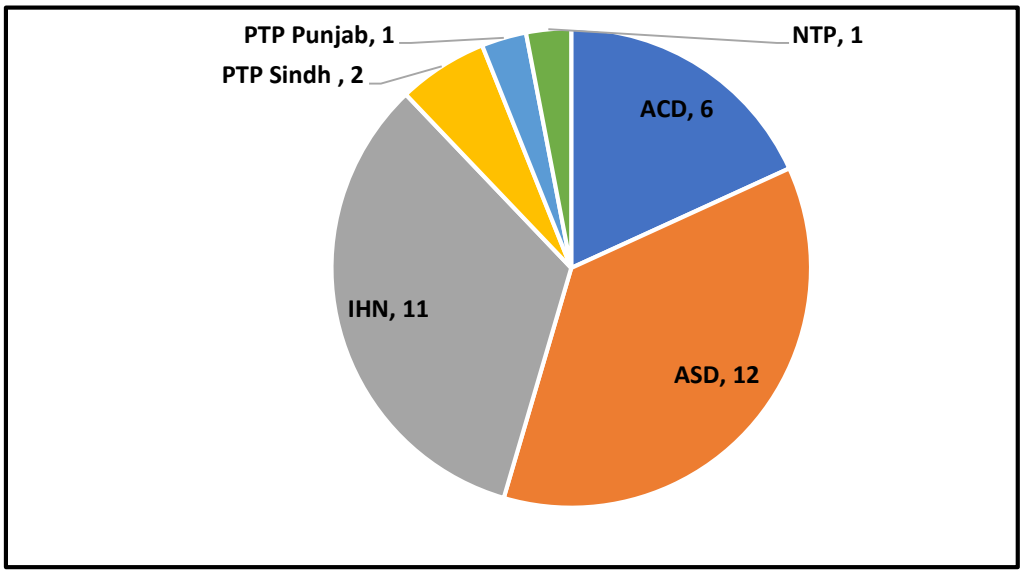


TABLE 15. List of PMDT sites (by province/region) and implementing partner during 2019

Province / Region	PMDT sites			
	#	Name of PMDT Site	PUBLIC/PRIVATE	Implementing Partner
AJ&K	1	AIMS Hospital, Muzaffarabad	PUBLIC	ACD-SR
Balochistan	1	Fatima Jinnah Hospital, Quetta	PUBLIC	IHN-PR
	2	DHQ Hospital, Loralai	PUBLIC	IHN-PR
Gilgit Baltistan (GB)	1	DHQ, Hospital, Gilgit	PUBLIC	ACD-SR
Islamabad (ICT)	1	PIMS, Hospital, Islamabad	PUBLIC	ASD-SR
Federal	1	Military Hospital, Rawalpindi	PUBLIC	NTP-PR
Khyber Pakhtunkhwa	1	Lady Reading Hospital, Peshawar,	PUBLIC	ASD-SR
	2	Ayub Teaching H-Abbottabad,	PUBLIC	ASD-SR
	3	MMC-Mardan,	PUBLIC	ASD-SR
	4	MMMTH, Dera Ismail Khan	PUBLIC	ASD-SR
	5	SS Teaching Hospital, Swat	PUBLIC	ASD-SR
Sindh	1	Ojha Chest Hospital, Karachi	PUBLIC	PTP-Sindh
	2	DHQ, Hospital, Mithi	PUBLIC	PTP-Sindh
	3	Chest Unit, JPMC, Karachi	PUBLIC	IHN-PR
	4	Chest Diseases Hospital, Kotri	PUBLIC	IHN-PR
	5	DHQ, Hospital, Mirpurkhas	PUBLIC	IHN-PR
	6	PMC, Hospital, Nawabshah	PUBLIC	IHN-PR
	7	CMC, Hospital, Larkana	PUBLIC	IHN-PR
	8	GMM, Civil Hospital, Sukkur	PUBLIC	IHN-PR
	9	Indus Hospital Karachi	PRIVATE	IHN-PR
	10	Delhi Medical Center, Karachi	PRIVATE	IHN-PR
	11	Red Crescent Hospital, Hyderabad	PRIVATE	IHN-PR
Punjab	1	Mayo Hospital, Lahore	PUBLIC	ASD-SR
	2	Jinnah Hospital, Lahore	PUBLIC	ASD-SR
	3	DHQ Hospital, Faisalabad	PUBLIC	ASD-SR
	4	DHQ Hospital, Sialkot	PUBLIC	ASD-SR
	5	DHQ Hospital, Sargodha	PUBLIC	ASD-SR
	6	Nishtar Hospital, Multan	PUBLIC	ASD-SR
	7	BV Hospital, Bahawalpur	PUBLIC	ASD-SR
	8	SZ Hospital, Rahim Yar Khan	PUBLIC	ASD-SR
	9	Samli Hospital, Murree	PUBLIC	ASD-SR
	10	Gulab Devi Hospital, Lahore	PRIVATE	PTP-Punjab
	11	Leprosy Hospital, Rawalpindi	PRIVATE	ASD-SR

Till 2019, the target achieved regarding establishment of PMDT sites remained low (73%), perhaps due to lack of domestic funding. The PMDT network is supported by a diagnostic network of quality assured 22 (17 BSL-2, 5 BSL-3) DST labs and network of 385 Xpert testing facilities for providing rapid DST services for diagnosis for RRTB. The MDR Unit at NTP provides regular monitoring and supervisory support at PMDT sites for onsite capacity building and troubleshooting. This is further complemented by provision of feedback to the implementing partners for issues rectification.

As per W.H.O Global TB Report, the estimated incidence of MDR/RR cases (13/100,000 population), the DR-TB case notification rate remained at 10% as 3004 cases were notified out of 29044 incident MDR/RR TB cases and put on both longer and shorter treatment regimens. This proportion stands at the lowest ebb as per the End TB Strategy indicator which is 70%.

TABLE 16. DR-TB case notification in Pakistan during 2019

Indicator	#
Total no. of patients who started treatment for MDR TB in 2019	**3,004**
Among 3004, no of children <15 who started treatment of MDR-TB	110
Patients started on Bedaquiline	1,339
No. of patients who started treatment for XDR TB in 2019	**34**

The proportion of DR-TB case notification is the highest in Punjab for both MDR (39%) and XDR TB (52%) whereas lowest in AJ&K. No MDR TB case was reported from FATA and no XDR TB case from Balochistan, FATA, GB and ICT. However, the disease burden of DRTB is relatively higher in the province of Sindh as compared to population proportion of Sindh (23%) to Punjab (56%).

FIGURE 20. DR-TB Case Notification (target v/s achievement by province) during 2019

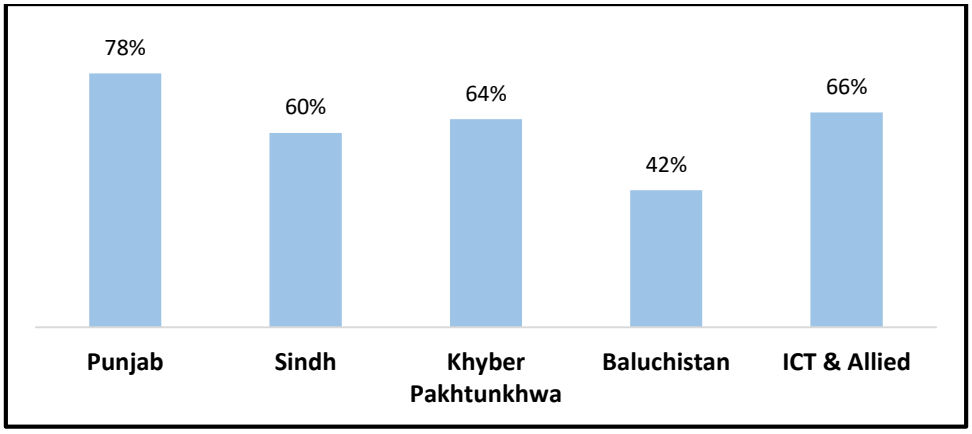
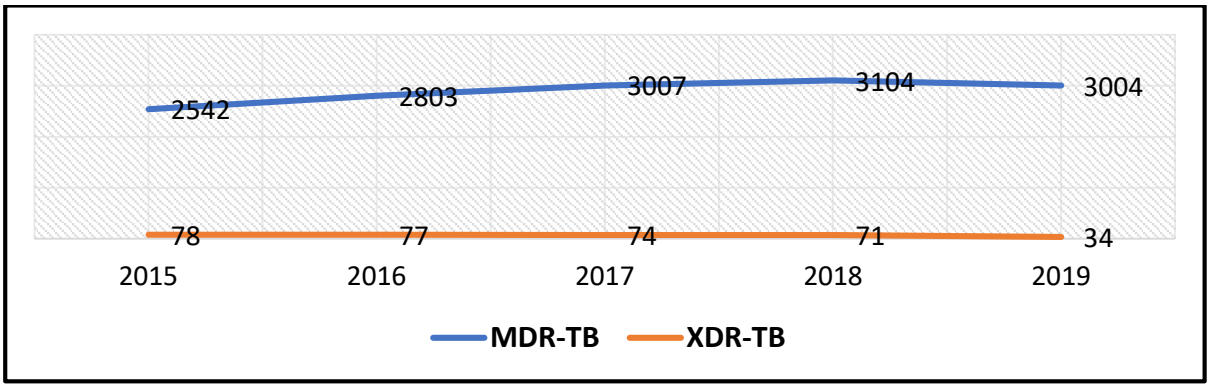


TABLE 17. DR-TB case notification in Pakistan (by province/region) during 2019

	MDR-TB		XDR-TB	
	#	%	#	%
AJK	11	0.4%	1	2.9%
Balochistan	82	2.7%	0	0.0%
FATA	0	0.0%	0	0.0%
GB	1	0.0%	0	0.0%
ICT	45	1.5%	0	0.0%
KPK	304	10%	4	11.8%
Punjab	1388	46%	18	52.9%
Sindh	1173	39%	11	32.4%
PAKISTAN	**3004**	**100%**	**34**	**100%**

FIGURE 21. DR-TB Case Notification in Pakistan during 2019



2.5.1. Treatment outcome of DR-TB:

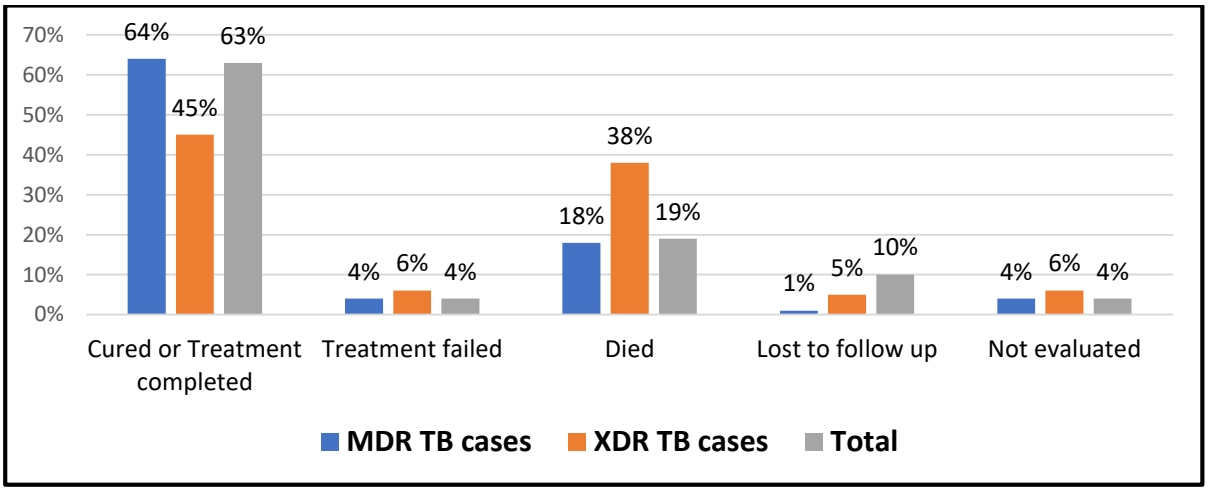
In the advent of introduction of novel drugs, regimens and new grouping of DRTB drugs, all PMDT sites are in continuous liaison with NTP for clinical guidance especially in difficult to treat DR TB cases. Each individual case is thoroughly discussed among a panel of DRTB experts at the National level before provision of guidance through email and telephonic communication to the PMDT site. Furthermore, all sites are provided necessary technical guidance at selection of treatment regimens and appropriate management of severe adverse events in reference to active TB drug-safety monitoring and management (aDSM).

Treatment outcome of DR-TB is declared after 18-24 months of the treatment (registration of the cohort notified two years earlier). The treatment success rate for longer treatment regimen (2017 cohort) was 63% while for shorter treatment regimen* (2018 cohort) was 74% (Short term regimen is not implemented in the province of Sindh). The reason for low TSR for DR-TB was supposed to be due to high mortality (19%) and lost to follow up rate (10%). During 2019, a total of 4,110 patients received DRTB treatment with uninterrupted provision of quality assured 2nd line drugs SLDs.

TABLE 18. Treatment outcome of DR-TB cohort 2017

Indicator		Cases registered in 2017	Cured or Treatment completed	Treatment failed	Died	Lost to follow up	Not evaluated
All confirmed MDR TB cases	#	2,813	1,789	119	510	296	99
	%		64%	4%	18%	11%	4%
All confirmed XDR TB cases	#	77	34	5	29	4	5
	%		45%	6%	38%	5%	6%
Total	**#**	**2890**	**1823**	**124**	**539**	**300**	**104**
	%	**100%**	**63%**	**4%**	**19%**	**10%**	**4%**

FIGURE 22. Treatment outcome of DR-TB patients registered in 2017 in Pakistan

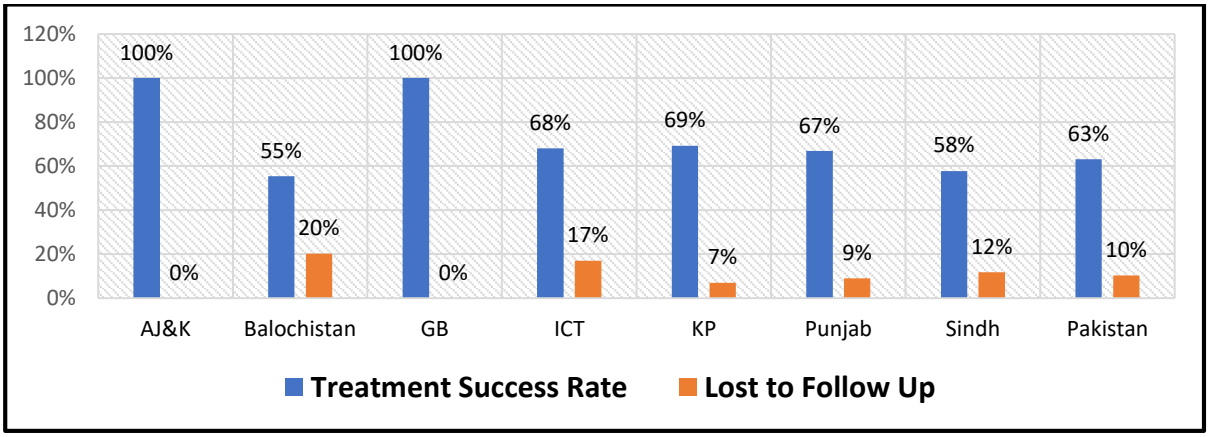


Overall treatment outcome of DR-TB patients at 63% while 64% and 45% for MDR and XDR TB respectively. The lost to follow up rate was achieved in XDR TB while that of MDR TB remained high. However, the death rate in XDR TB was double to that among MDR TB.

TABLE 19. Treatment outcome of DR-TB cohort 2017 (by province/region)

Province/ Region	DR-TB cases who started treatment	Cured	Treatment Completed	Died	Treatment Failed	Lost to Follow Up	Not Evaluated
AJ&K	8	7	1	0	0	0	0
Balochistan	74	36	5	16	2	15	0
GB	3	2	1	0	0	0	0
ICT	47	26	6	4	0	8	3
KP	270	183	4	50	6	19	8
Punjab	1263	831	13	266	54	114	55
Sindh	1225	691	17	203	62	144	38
Total	**2890**	**1776**	**47**	**539**	**124**	**300**	**104**

FIGURE 23. The TSR and LTFUR of DR-TB (both MDR & XDR) Cohort registered in 2017 (by province/region) in Pakistan



The overall TSR and LTFUR remained 63 and 10% respectively. Neither of the two indicators reaching the End TB Strategy targets at national level. The highest TSR was observed in AJ&K, followed by GB and KP. The highest lost to follow up rate was demonstrated in Balochistan followed by ICT and Sindh. None of the province/region could achieve the desired targets for lost to follow up rate except GB.

2.5.2. Major initiatives and policy decisions for DR-TB by NTP Pakistan:

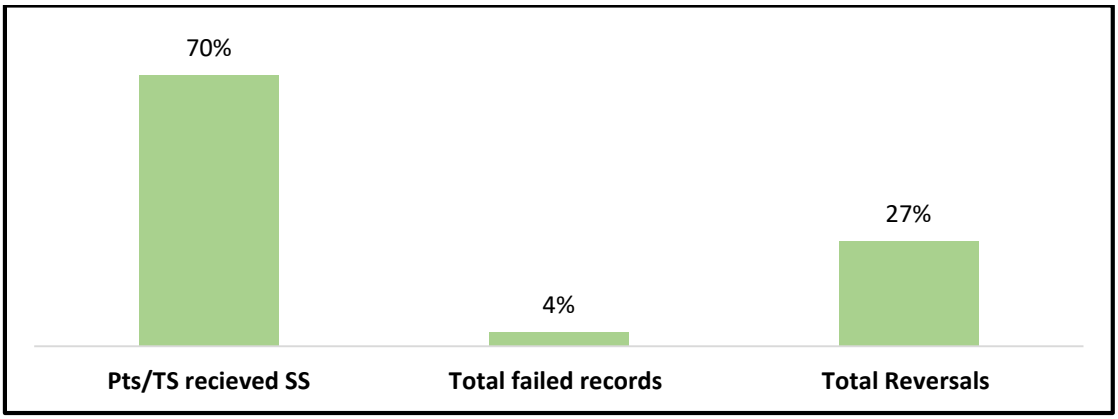
i. Revision of National DRTB Guidelines. DRTB guidelines have been revised in the light of latest WHO recommendations. This revision was done following endorsements from Pakistan Chest Society (PCS) and Provincial TB Control Programs through Technical Working Groups (TWG) meetings.

ii. Introduction of All Oral Longer Regimens. NTP is among the few TB control program which promptly follow and implement latest WHO recommendations both in clinical and programmatic context. On the same lines, all oral longer treatment (Bedaquiline containing regimen) was adopted throughout the country following capacity building of all PMDT staff.

iii. Development of aDSM guidelines. In the light of WHO recommendations, National guidelines on active TB drug-safety monitoring and management (aDSM) along with SOPs and reporting tools are developed; and is currently under phasic roll out throughout the country. Human resource capacity building was done on key concepts, reporting tools and SOPS for aDSM. All reporting tools are currently under printing process.

iv. Social Support. An improved system for provision of social support for DRTB patients is developed through establishment of an additional facility of **Mobile Wallet/ATM Cards.** The beneficiaries (DRTB patients & treatment supporters) are now supported through a large number of one link ATM machines for easy and user friendly disbursement of cash. This was preceded by capacity building by a private vendor (M/S Telenor) which conducted onsite training sessions for PMDT staff and SRs.

FIGURE 24. Status of Social Support disbursement to DR-TB patients in Pakistan during 2019



A pilot (enhanced DRTB package) was successfully conducted at 2 PMDT sites (LRH, Peshawar & Samli Sanatorium, Murree) through USAID support; which resulted in zero "Lost to follow-up".

v. Human Resource Capacity Building. A total of 70-80 staff at PMDT sites including Physicians, Chest Specialists and Pharmacists at 33 PMDT sites were trained on revised all oral DRTB guidelines and aDSM reporting.

vi. Decentralization of DRTB services. As per JPRM recommendations and under WHO guidance, in 2019 NTP initiated advocating decentralization of DR-TB services. Bringing the DRTB services close to their residences will effectively improve treatment outcomes (esp. mortality and lost to follow up) for DRTB patients. In pursuance to this, NTP initiated development of all necessary tools and templates for subsequent utilization during national and provincial consultative workshops on decentralization of DRTB services. The National workshop, served as a ground breaking event was attended by all public/private partners. The objective during the national workshop was to create awareness and build a national level consensus among all stakeholders on the emerging concept of decentralization. The national level workshop was followed by "2" two provincial level workshops conducted at Multan and Peshawar. The participants for provincial workshop included health care workers (chest specialists, administrators and DTCs) from selected "5" high burdened TB facilities from each province respectively. The primary objective for these provincial workshops was to assess site's readiness in reference to availability of diagnostic facility & human resource once actual decentralization roll out starts at district level.

Low DRTB diagnosis and enrolment which is mainly attributed to less than optimal sites for DRTB services (one site for 8 million people), weak sputum transport systems within the district between BHU, RHC and Xpert site, challenges in compliance to National Guidelines for universal DST, and gradual decline in DSTB notification.

Amongst the challenges are high mortality (18%) and lost to follow-up (9%) in DR-TB patients is due to weak implementation of pharmacovigilance (& Adsm), poor peripheral linkage of DR-TB ambulatory based model of care, Involvement of private sector in referral and management of MDR-TB, social support disbursement, weak monitoring and supervision and minimum domestic support.

2.6. TB Prevention - Contact Investigation

Tuberculosis (TB) contacts are people who have close contact with patients with infectious TB. As they are at high risk for infection, TB contacts should be investigated systematically and actively for TB infection and disease. Such interventions are called 'tuberculosis contact investigations'. They contribute to early identification of active TB, thus decreasing its severity and reducing transmission of Mycobacterium tuberculosis to others, and identification of latent TB infection (LTBI), to allow preventive measures.

As per W.H.O guidelines, either a tuberculin skin test (TST) or an interferon gamma release assay (IGRA) can be used to test for latent TB infection (LTBI). A TST or IGRA is not a requirement before initiating tuberculosis preventive therapy in persons living with HIV and for children less than five years who are contacts of people with active TB disease. As per national TB guidelines, 100% contact of B+ should be investigated for TB and put on preventive therapy if not found TB. The number of household contacts of bacteriologically-confirmed pulmonary new and relapse TB cases notified in 2019 are not known. However, 201728 household contacts were evaluated in 2019 and among those, 5689 (3%) household contacts of bacteriologically confirmed pulmonary new and relapse TB cases were put on TB preventive treatment. All these contacts were children <5 year of age.

2.7. TB/HIV

With an estimated prevalence of less than 0.1%, Pakistan has a low-level HIV epidemic among the general population, however, serial surveillance indicates concentrated epidemics among key populations such as People Who Inject Drugs (PWIDs) who had an average HIV prevalence of 37.8% in 2017. In general, the implementation of TB/HIV collaborative activities in Pakistan remained low.

There has been limited testing of TB patients for HIV in Pakistan. In 2016, only 4% of TB patients were tested for HIV. This increased to 24% in 2019. Among the patients tested for HIV in 2019, 1% were positive. The NTP in collaboration with the National AIDS Program has established a National TB/HIV Collaborating Board, and provincial level TB/HIV coordination committees. There are currently 41 sentinel sites, which focus on the surveillance of HIV infection in TB patients.

People Living with HIV are tested for TB using Xpert at the Sentinel sites and are provided IPT if no disease is detected, however, this is not always done. Pre-test counselling is not always done and if done then Voluntary Counselling and Testing (VCT) standards are not always followed. Among the total notified DS-TB patients (315815), only 622 (0.4%) were found HIV+ and among those 494 (79%) started or continued on antiretroviral therapy (ART).

TABLE 20. TB/HIV screening status during 2019 (by province)

Province / Regions	TB Patients notified (all forms)	TB Pts screened for HIV		Pts found HIV+	
		#	%	#	%
Punjab	187,658	153,092	82%	399	0.3%
Sindh	74,695	12,575	17%	138	1%
KP	40,881	2,277	6%	13	1%
Balochistan	11,085	614	6%	28	5%
Federal (ICT)	1,496	357	24%	44	12%
Total	315,815	168,915	53%	622	0.4%

The table shows that maximum number of TB cases were screened at ICT (58%) followed by Sindh and Punjab. Similarly, the HIV positivity remained at the highest in ICT followed by Sindh and Punjab. Overall screening rate among TB cases remained quite low (24%) as compared to national target (60%) and hence the HIV positivity rate (0.9%). The HIV positivity Rate among those screened remained at the lowest in the province of Sindh (0.7% positivity against 36% screened)

FIGURE 25. Proportion of TB cases (all forms) screened for HIV and found HIV+(by province) during 2019

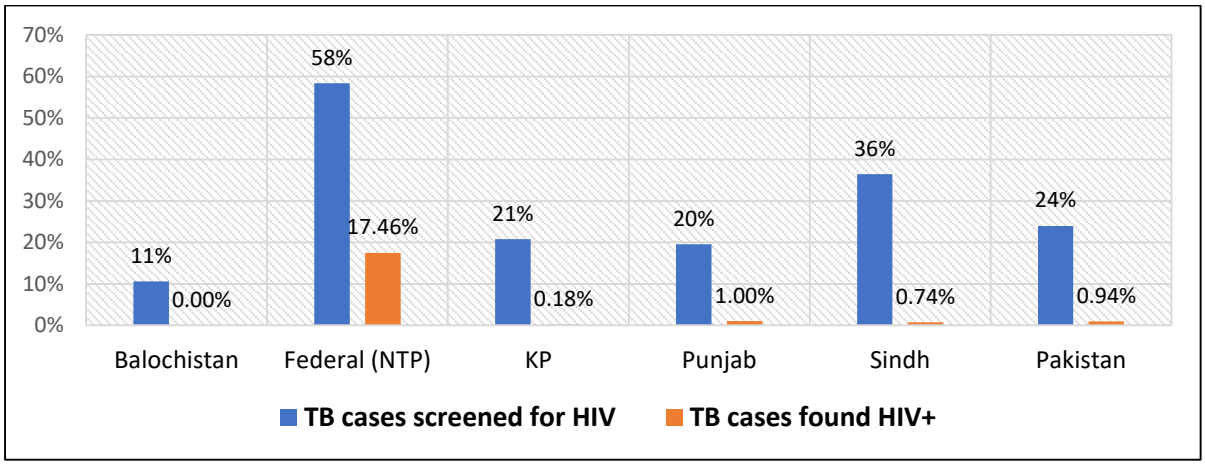
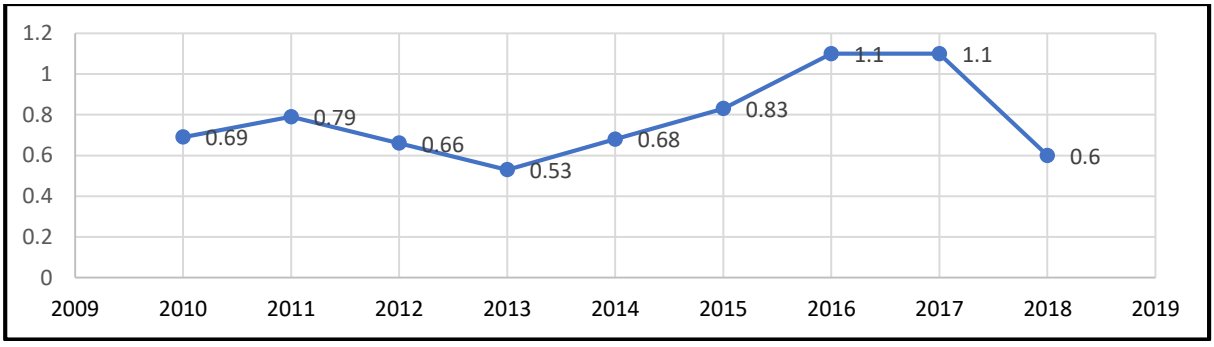


FIGURE 26. Trend HIV-Positive TB Mortality Rate (per 100000 population) over the years (2010-2019)



The figure depicts that despite some gross variations, the overall TB/HIV+ mortality has not been affected much over the past decade.

2.8. Advocacy Communication and Social Mobilization:

To demonstrate the political commitment to TB care and prevention and to begin to pursue the United Nations General Assembly-TB-UNHLM and the END TB strategy targets, the Islamic Republic of Pakistan declared a National End TB initiative on World TB day 2019. The 'END TB' initiative was launched by His Excellency President of Pakistan on April 3, 2019.

Along with the President's house function which was the biggest achievement of World TB day of 2019, there were also other activities held in connection with the WTD. NTP held a sports mela along with the local Government and other stakeholders. There were a number of sports competitions and a rally which aimed to spread awareness about TB. All major

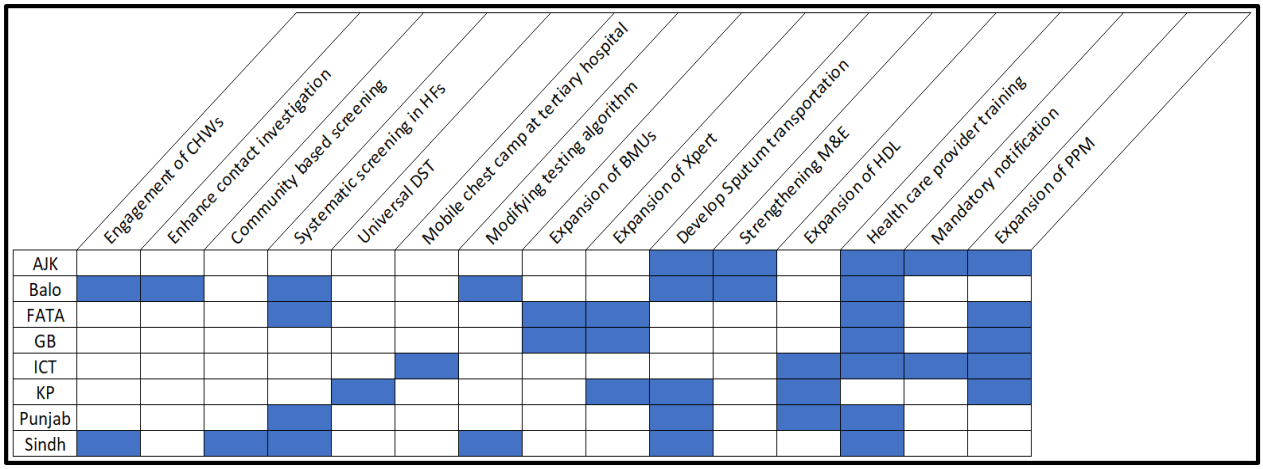
stakeholders, WHO, Partners participated with zeal and zest and became a part of that year's theme 'Its Time'

- *Bait ul maal:* JRPM members along with NTP team visited Bait ul maal, Mr Aon Abbas chaired the meeting accompanied by Director Program and Director Health Bait ul maal. Upon discussion, it was dawned that Bait ul maal is in some cases already providing financial assistance to some of the MDR TB patients. Still they graciously committed to provide grocery to MDR TB patients and extension in phases to all over Pakistan after some initial piloting in some districts.
- *Islamabad Chamber of Commerce & Industry:* NTP team briefed regarding the TB situation and ICCI agreed to provide support in the TB free Islamabad inititave, also ICCI would provide assistance for mass screening of slums, industrial workers madrassas and communities for detection of missing cases. Mobile medical camps will be established in different industrial areas and ICCI will be a partner of NTP to END TB.

2.9. Important Events

2.9.1. Patient centered meeting:

Patient centred meeting was held from 16-18 Jun 2019. All the provinces participated the meeting was supported but WHO and and objectives were to analyze the data and set priority areas for intervention which are directly related to the TB patients. The key intervention proposed by provinces are as under:



The use of people-centred framework during the workshop promotes evidence-based discussions when identifying and prioritizing programmatic gaps, causes and determinants of prioritized gaps, and strategic interventions. By the end of the workshop, Pakistan NTP has identified prioritized problems and the potential strategic interventions at province/region-specific level and national level Low population screening rate, decreasing trends of bacteriologically-confirmed TB, poor quality of diagnosis in some areas (particularly for childhood TB and EPTB), and low enrolment of DR-TB were the current highlighted issues/gaps in Pakistan.

Strengthening Hospital DOTS Linkage, review, improve and expand existing local PPM models and other active case finding approaches in terms of effectiveness, efficiency and quality of diagnosis needs to be considered. Critical infrastructure issues (weakness in some provinces/regions (administrative, HR, finance, number of BMU) need to be assessed and addressed.

2.9.2. ***Protocol Development Workshop "Assessment of clinically diagnosed Tuberculosis":***

(October 7-8, 2019) was held with the following objectives;

- To assess the TB diagnostic pathways currently followed in public and private facilities to diagnose new and previously treated TB patients and assess adherence to national standard diagnostic
- To estimate the likelihood of true TB among clinically diagnosed TB cases put on treatment distinguishing between the proportion "most likely not TB" and "most likely TB".
- To provide reasons for a high proportion of clinically diagnosed cases among notified TB patients.

2.9.3. ***Disease Control Priorities (DCP3) project meeting (25-29 Dec 2019):***

DCP3 project leverages the global investment to support the acceleration of progress towards Universal Health Coverage (UHC) in Pakistan. DCP3 is a valuable resource that provides a global synthesis of evidence on a range of health interventions. DCP3 evidence can help decision makers allocate constrained budgets to maximise population health and welfare, through informing the design of UHC benefit package. DCP3 provides the institutional development and local analysis required to incorporate evidence into national priority setting processes; in a way that promotes transparency, linkages with health sector financing mechanisms, and encourages engagement with the public and civil society.

TABLE 21. TB package of services v/s per capita treatment of TB patient

Tuberculosis Package of Services		Per capita treatment of TB patient (emergency): US$200 to US$500;
Community level	Routine contact tracing to identify individuals exposed to TB and link them to care	US$273 per person (community-based treatment)
Community level	Symptomatic screening and referral for chest radiograph for PLHIV and children under five who are close contacts or household members of individuals with active TB; if no active TB, provision of isoniazid preventive therapy according to WHO guidelines	
Community level	Screening for latent TB infection following a new diagnosis of HIV, followed by yearly screening among PLHIV at high risk of TB exposure	US$60-90 per DALY
Community level/ PHC centre (Recommendation of starting at DHQ/THQ level)	Diagnosis of TB including assessment of rifampicin resistance using rapid molecular diagnostics (UltraXpert), and initiation of first-line treatment per current WHO guidelines for drug-susceptible TB; referral for confirmation, further assessment of drug resistance and treatment of drug-resistant TB	Add Xpert to smear to diagnose TB: US$1,000 per DALY; First Line Treatment: US$60- 200 per DALY
Community level	Screening of HIV in all individuals with a diagnosis of active TB; if HIV infection is present, start (or refer for) ARV treatment and HIV care	
Community level	Screening for latent TB infection following a new diagnosis of HIV, followed by yearly screening among PLHIV at high risk of TB exposure; initiation of isoniazid prevention therapy among all individuals who screen positive but do not have evidence of active TB	

First-level hospital	Referral of cases of treatment failure for drug susceptibility testing; enrolment of those with MDR-TB for treatment per WHO guidelines (either short or long term regimen)	Cost per patient of treating MDR TB: US$17,164 Global average cost per patient of treating MDR TB is US$13,259
Tertiary-level hosp	Specialized TB services, including management of MDR- and XDR-TB treatment failure and surgery for TB	Cost per patient of treating MDR TB: US$17,164
Population level (Also at Community level)	Systematic identification of individuals with TB symptoms among high-risk groups and linkages to care (active case finding)	
PHC centre (Recommendation of starting at DHQ/THQ level)	using rapid molecular diagnostics (UltraXpert), and initiation of first-line treatment per current WHO guidelines for drug-susceptible TB; referral for confirmation, further assessment of drug resistance and treatment of drug-resistant TB	TB: US$1,000 per DALY; First Line Treatment: US$60-200 per DALY

2.9.4. UNDOC TB HIV in prisons:

A bio-behavioural surveillance study was conducted in the selected prisons of Sindh and Khyber Pakhtunkhwa provinces. A detailed behavioural assessment made, followed by serological sampling for HIV along with other communicable diseases such as TB, Hep C.

2.9.5. World TB day 2019:

World TB Day commemorations were conducted in March 2019 witnessed by the political commitment at the highest level. The events started with an advocacy session in Presidency chaired by honourable President of Pakistan Dr Arif Alvi and attended by dignitaries from all over the country. The Islamabad declaration to end TB was unveiled. The government of Pakistan stands committed to earnestly work with members of the international community to prevent unnecessary deaths, lift people out of poverty, and make progress towards achieving other sustainable development goals to end the TB epidemic by 2030.

2.9.6. Development of National Strategic Plan (2020-23):

NTP kicked off to develop national & provincial strategic plans were developed through a series of consultations with all stakeholders including other government departments. The process was supported by WHO. This plan aims to secure and sustain political commitment, through continuous advocacy directed at high level policy makers in Pakistan. It aims to increase national ownership and oversight, increase the financing for TB especially via sustainable domestic resources, and facilitate a supportive legal and regulatory environment. The main focus of National strategic plan is at the:

- Successful treatment for 1.6 million cases of tuberculosis Including 200,000 children
- Treatment for 35,000 cases of multi-drug resistant (MDR) TB,
- 1.6 million courses of (preventive) treatment of latent TB infection

2.9.7. Development of National guidelines & Training material:

The guidelines were revised and all technical & training material as revised in line with the WHO 2017 guidelines of TB Management. The following guidelines are revised & printed and disseminated to provinces:

- National TB management guidelines
- Training module TB management for doctors & Paramedic
- TBHIV management guidelines and training module
- Recording and reporting tools

2.9.8. Establishment of HELPLINE 0800-88800:

National TB control program established a call ceneter and Help line **0800-88000** & 4- digit SMS code 9112 for any kind of information about TB, its facilities, and location of health care providers for free services.

2.10. Mandatory TB Case Notification:

Mandatory TB Case Notifications Acts have been approved by the provincial legislative assemblies of Sindh, KPK and Punjab so far in Pakistan. National TB Control Program is supporting/facilitating Provincial Health Departments and Provincial TB Control Programs in implementation of the bylaws through Global Fund supported pilot project in 5 Districts, Peshawar & Mardan in KPK and Hyderabad, Jamshoro and Matari in Sindh. The main deliverable of these projects are to increase network of TB notifying facilities in the country, to initiate Electronic TB Case Notification through a web based software and to increase the National TB Case Notification by detection of missed TB cases. Project has been started from July-19 and following are key achievements;

- 4-digit short code and toll free Help line Nos 0800-88800 have been issued, Helpline/call centre has been established and operationalized in December, 2019
- DHIS application have been developed, gadgets have been provided to field teams and online notification has been started
- 2300 pharmacies have been visited by field team to collect the data of ATT sale and doctors prescribing ATT
- 1000 GPs were visited by field staff to communicate the TB Patient Notification ACT and processes of online TB case notification
- 216 private health care providers have been registered with NTP through online registration system
- 09 patients have been notified by registered private healthcare providers
- Inception meetings have been conducted at provincial level
- Online Training portal on National TB patient Management Guidelines is in process of development and will be completed in September 2020

2.10.1. Online TB management portal:

Tuberculosis is a notifiable disease in Pakistan which means that all health care providers are required to inform the health authorities to inform regarding the patients diagnosed as TB and put on treatment. The health care providers managing Tuberculosis will be given access to the online training course to ensure standardized TB care according to National TB management guidelines The web based online training course designed for the health care providers will provide step by step guidance to identify the TB presumptive appropriately diagnose and treat TB patients. National TB Program has also developed a mobile application for electronic notification of a TB case.

The objective of the development of an Online training portal for TB Management accredited with a national university is to make National guidelines for TB management accessible to all health care providers in the country.

Common Management Unit (CMU) to manage the Global Fund Grants on AIDS, TB & Malaria, MoNHS&C will be the exclusive owner of the manual(s) developed and the consulting firm shall not be allowed to use these in any of their future assignments, unless permitted in writing by the CMU management.

2.11. Multi Country Grant QMZ-T-UNDP:

The United Nations Development Program (UNDP), is implementing the Project of Multi-Country Grant (MCG) as Principal-recipient of the GF in Iran, Afghanistan and Pakistan with the aim of finding and treating TB cases among mobile Afghan Population. The grant focuses on TB care services provision to the refugee populations, structured referral mechanism among the three countries, screening the refugee population living with the host communities, in refugee villages (RV), and thousand crossing the border & generate evidence through research. NTP Pakistan as Sub-recipient is limited to provision of TB care to the Afghan National living in 21 (out of 55) refugee villages in the provinces of KP and Baluchistan.

TABLE 22. Objective and Interventions regarding multi country grant

Objectives	Interventions
• Strengthening collaboration, information sharing and diagnosis/treatment service referrals between health services with the aim of finding and treating TB cases among mobile Afghan populations • Strengthening cross-border collaboration, information sharing, and referrals among NTPs in the three countries • Strengthening the capacity of the national TB control program in Afghanistan to effectively diagnose and treat TB cases amongst returnees.	• Active case finding through symptom screening of tuberculosis seeking health care at health centres at RVs health centres especially women and children and household contact screening of a TB patient • Community engagement through Community Coalition of volunteers in RVs • Community outreach gathering in the community for TB and its available services • Upgrading health centres for TB services (referral and guidance) • Generate evidence through operational research for policy change

TABLE 23. Achievement (No. of TB patients detected) in KP from Nov-Dec 2019.

S. No	District	Refugee Village Name	Population size	Number of FHWs	# screened at facility level	# of Presumptive facility	Confirmed TB cases facility	# screened from household contact	# of Presumptive contact	Confirmed TB cases contact
1	Peshawar	Badaber	15,205	2	174	20	6	12	0	0
2	Peshawar	Kababian	4,450	2	44	9	0	73	0	0
3	Kohat	Ghamkol	44,481	2	282	188	0	73	42	0
	Kohat	Ghulam Banda	18,891	2	172	93	0	62	36	0
4	Nowshera	Akora Khattak	29,266	3	252	46	3	21	8	0
5	Nowshera	Khairabad	18,188	2	292	38	4	84	23	0
7	Mardan	Jalala	14,330	2	172	17	1	22	7	0
8	Swabi	Barakai	30,132	2	243	70	1	85	40	0
9	Swabi	Gandaf	21,602	2	623	69	1	23	3	0
10	Mansehra	Bareri	9,818	1	90	23	0	48	16	0
11	Mansehra	Khaki	14,178	1	50	1	1	2	2	0
12	Haripur	Padhana	13,595	1	101	15	0	45	11	0
13	Haripur	Panian	44,566	2	263	37	4	116	24	1
	Total		**278,702**	**24**	**2758**	**626**	**21**	**666**	**212**	**1**

The Multi country interventions are supervised by NTP and PTP coordinators, each placed at Peshawar & Quetta. The TB patient's data from these RVs are included in the district data, however the Afghan refugee's status being mentioned in the TB registers and other R&R tools.

CHAPTER 3. STRENGTHENING LABORATORY AND DIAGNOSTIC SERVICES

The objectives of TB Lab services aim to provide services for diagnosis of TB in presumptive TB cases, detection of Rifampicin resistance (RR) for all TB patient and comprehensive drug susceptibility testing for RR patients to guide treatment regimen and culture services for monitoring treatment response.

TABLE 24. TB laboratory network/diagnostic services (by province/region) in Pakistan during 2019

	Total	Microscopy	GeneXpert	Culture	DST	
					gDST(LPA)	pDST (MGIT)
Pakistan	**1,335***	**1,335**	**327**	**13**	**10**	**6**
Punjab	540	540	131	5	3	2
Sindh	367	367	94	5	3	1
KP	212	212	37	2	2	1
Balochistan	100	100	31		1	1
FATA	26	26	6			
GB	22	22	12			
AJ&K	61	61	10	1		
ICT	7	7	6		1	1

**Private laboratories not included*

TABLE 25. TB diagnostic facilities in Pakistan during 2019

Indicator	Number of sites providing these services at the end of 2019	Number of sites covered by a comprehensive EQA system in 2019
Smear microscopy	1,746	1,299
Xpert MTB/RIF	361	286
Culture	22	
Genotypic Drug Susceptibility Testing (DST)	7	
Phenotypic DST for first line drugs (FLD) only (no testing for second-line drugs (SLD))	3	2
Phenotypic DST for FLDs & SLDs	5	4
Line Probe Assay (LPA) for rifampicin and isoniazid only (no second-line LPA)	0	0
Line Probe Assay (LPA) for rifampicin, isoniazid, fluoroquinolones, second-line injectable	10	8

3.1. TB Laboratory Services for DS-TB

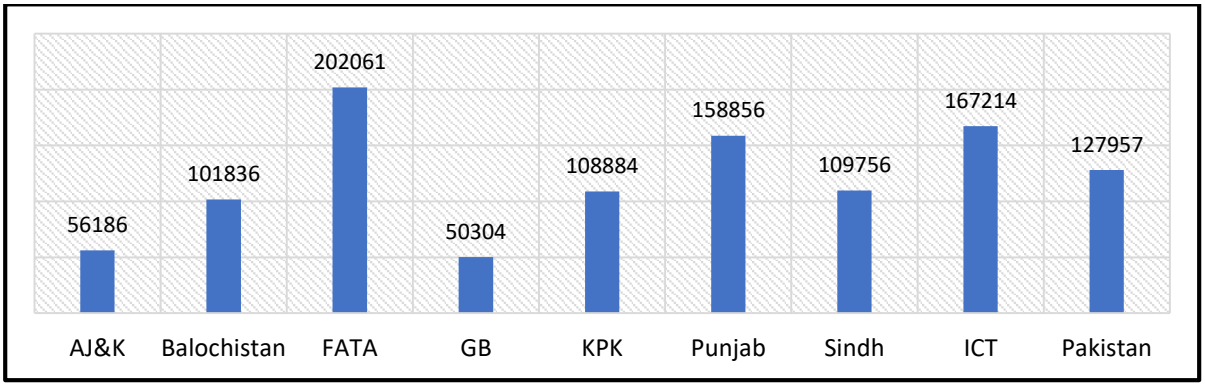
3.1.1. Microscopy services:

AFB smear microscopy remains front line tool for diagnosis where Xpert/MTB RIF is not available on site. Two smears are examined for diagnosis and one smear for monitoring treatment response at the end of 2nd, 5th and 6th month. Most of the public sector BMUs, selected private sector hospitals and NGO health clinics are offering Microscopy services. Diagnostic coverage is expanded by engaging private laboratories. Blinded rechecking for quality assured microscopy is implemented to cover all microscopy laboratories. A total of 1746 laboratories including 411 private laboratories (supported by GF) were reporting in 2019.

TABLE 26. Microscopy services coverage at peripheral level by province/region in Pakistan

	DHQ	THQ	RHC	BHU	TCH	Para-statal	TB Clinic	Others	NGO	PPM	Total MCs	Population	Avg pop/DC
Punjab	31	79	306	8	12	29	12	28	35	183	723	114,852,929	158,856
Sindh	18	49	99	64	10	8	7	26	86	91	458	50,268,259	109,756
KP	19	14	83	11	6	5	14	45	15	85	297	32,338,641	108,884
B.Tan	25	1	29	29	1	0	3	10	2	30	130	13,238,716	101,836
FATA	7	2	4	1	0	0	3	9	0	0	26	5,253,588	202,061
GB	7	3	1	0	0	0	9	2	0	6	28	1,408,498	50,304
AJK	8	8	24	9	1	0	10	1	0	11	72	4,045,366	56,186
ICT	0	0	1	2	2	1	0	0	1	5	12	2,006,572	167,214
Total	**115**	**156**	**547**	**124**	**32**	**43**	**58**	**121**	**139**	**411**	**1746**	**223,412,569**	**127,957**

FIGURE 27. Average population coverage per microscopy center (by province/region) in Pakistan during 2019



The above figure shows that overall population coverage per microscopy center is 127957 at national level which is optimal and quite close to the recommended population coverage in a high burden country like Pakistan. The lowest population coverage is in FATA reflecting dense and accessible microscopy services relevant to the terrain, Conversely the highest population coverage in GB followed by KP, Sindh and Punjab represent high accessibility as well as low burden on microscopy centers. The biggest populous provinces of Punjab and FATA have highest population per MC necessitating establishment of more MCs in these areas.

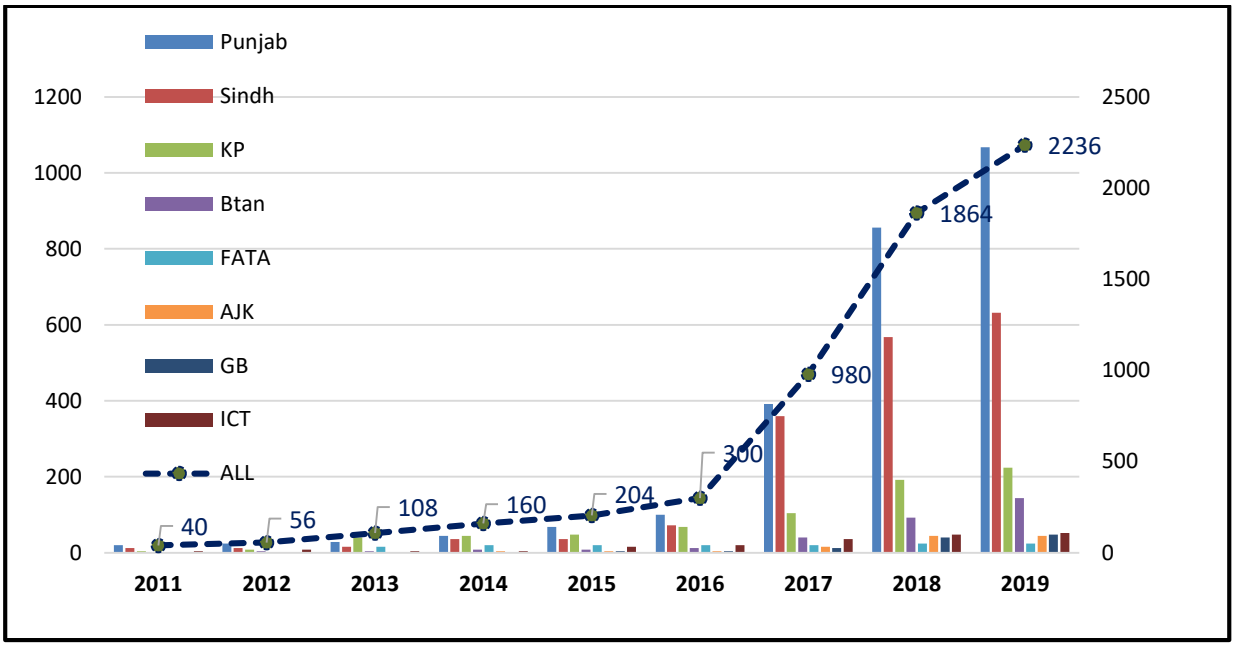
Performance Indicators Microscopy services

- Positivity rate among Presumptive TB Cases. A gradual decline is seen in positivity rate from 16.6% in 2010 to 11.2% in 2018.
- Positivity rate among follow –up examination is showing gradual increase from 3.2% in 2010 to 4.6% in 2018 an indirect evidence of improvement in quality of microscopy services.

3.1.2. GeneXpert Network

In 2019, number of laboratories with GeneXpert increased from 251 in 2018 to 327 with 361 machines including 295 GX-IV and 66 GX-XVI modules installed in these laboratories.

FIGURE 28. Scale up of GeneXpert by modules in Pakistan (2011-2019)



3.1.3. Testing for Drug Resistance:

TABLE 27. FLD/SLD slide testing in pakistan during 2019

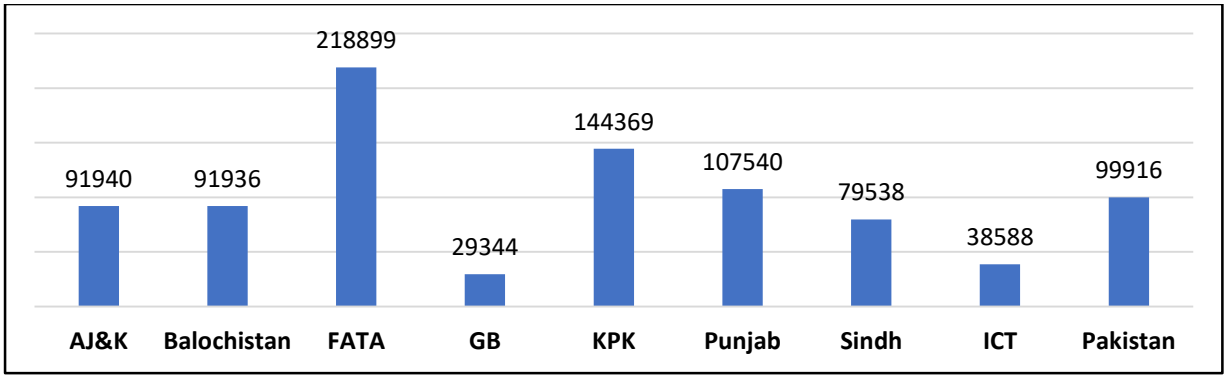
Indicator	New	Previously treated including Relapse	Previous treatment history unknown	Total
First Line Drug Testing				
Among the bacteriologically confirmed pulmonary TB cases, number of previously treated cases	122,337	13,423	149	**135,909**
Among bacteriologically confirmed pulmonary TB patients, patients tested for RR	71,841 (59%)	11,982 (89%)	-	**83,823 (62%)**
Among tested, patients reported RR	2,946 (4%)	874 (7%)	-	**3,820 (5%)**
Among total RR, Child hood cases reported			-	**110 (4%)**
Among those tested for RR, those reported resistance to INH	1331 (2%)	1,332 (11%)	-	**2,663 (3%)**
Second Line Drug Testing				
Total no. of pulmonary MDR-TB patients with test results for any fluoroquinolone (FQ) and any second-line injectable agent (2LI)				**2226**
Among MDR-TB patients reported, no. of patients with any resistance to both FQ and 2LI (XDR-TB)				**58**

With exponential scale up of modules to 2236 coverage has improved the population coverage per module to 99916 with improved coverage in provinces with highest coverage in ICT, Sindh and GB as reflected in the table and figure below.

TABLE 28. Number of laboratories v/s modules (by province/region) in Pakistan during 2019

Province/ Region	Punjab		Sindh		KP		B'tan		FATA		AJK		GB		ICT	
	Lab	Mod	Lab	Mod	Lab	Mod	Lab	Mod	Lab	Mod	Lab	Mod	Lab	Mod	Lab	Mod
2019	131	1068	94	632	37	224	31	144	6	24	10	44	12	48	6	52
Pop Coverage /Module	**107,540**		**79,538**		**144,369**		**91,936**		**218,899**		**91,940**		**29,344**		**38,588**	

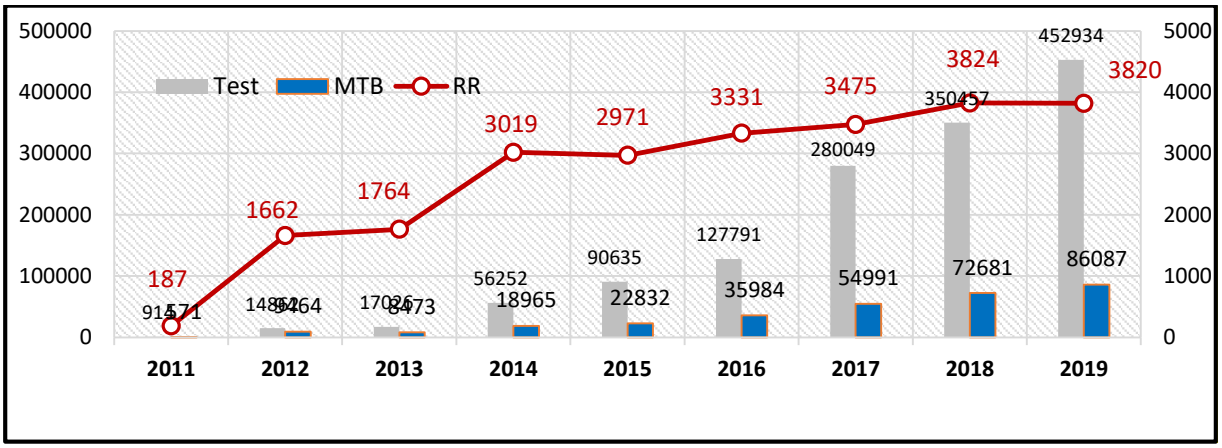
FIGURE 29. Population coverage per GeneXpert module (by province/region) in Pakistan during 2019



3.1.4. GeneXpert Testing:

In year 2019, a total of 45, 2934 Xpert tests were performed. Including 299,229 collectively by NTP sites and 138,730 by the IHN and 14975 by MC supported sites. Among all tested 860878 were reported positive for MTB and 3820 rifampicin resistant cases were detected.

FIGURE 30. Trend XPERT Testing, MTB Confirmed TB cases and RR TB cases detected (2011-2019)



GeneXpert Performance indicators by testing algorithm:

At NTP/PTP supported Xpert sites, most of the testing was performed as follow on to microscopy and 3186 RR/TB cases were detected on testing. With improved coverage and broadening of GeneXpert testing, proportion of MTB positive among tested has declined from

46%in 2014 to 23.5%in 2019 and RR detected among MTB positive from 18.9% in 2014 to 4.6% in 2019.

In contrast, at IHN administered Xpert sites, with universal X-ray screening for identification of presumptive TB cases followed by Xpert testing, Of all 138730 Xpert testing performed in 2019, 9.5% were MTB+ and 3.5%(467) RR TB cases were detected among these. Similar to NTP/PP sites with increase in testing a decline in proportion of RR from 7.5% in 2014 to 3.5% in 2019 was observed.

GeneXpert Performance indicators by Provinces:

The trend of Xpert testing over the last five years shows Xpert testing performed in each province, with increase in coverage and testing, a decline in proportion of MTB positive along with a decline in proportion of rifampicin resistant TB cases across all provinces. In 2019 average RR is 4.5% ranging from 4.8% in Punjab to 1.4 in FATA.

TABLE 29. Xpert testing, MTB and RR detection (by province/by partner) in Pakistan during 2019

Province/Partner	Tested	MTB+ve		RIF Resistant	
Punjab	105,463	29,611	28.1%	1407	4.8%
Sindh	114,848	25,552	22.2%	1198	4.7%
Balochistan	17,177	3,607	21%	141	3.9%
KP	**31,326**	7,117	22.7%	318	4.5%
FATA	2,622	668	25.5%	11	1.6%
AJK	9,967	1,298	13.%	37	2.9%
GB	4,963	353	7.1%	5	1.4%
NRL/ICT	12,862	2,150	16.7%	97	4.5%
NTP Sites (Total)	**299,229**	**70,356**	**23.5%**	**3216**	**4.6%**
IHN-Sites	138,730	13,400	9.7%	467	3.5%
MC-Sites	14,975	2,331	15.6%	139	6.0%
Pakistan	**452,934**	**86,087**	**19.%**	**3820**	**4.4%**

GxAlert: GeneXpert connectivity and real time data monitoring:

GxAlert, a medical device software that collects data from GeneXpert machines and shares it with relevant health officials and alerts them when drug resistant TB is detected by the GeneXpert machine was installed in 69.8%(252/361) machines by end of 2019. More than 65% of Xpert sites are now connected in all Provinces with the exception of FATA This intervention will help reduce time to treatment by getting patients enrolled earlier and also provides real-time and complete disease surveillance monitoring capabilities.

TABLE 30. Updated summary of GX-alert deployment (by province/region) in Pakistan during 2019

	Punjab	Sindh	KP	B'tan	FATA	AJK	GB	ICT	Total
Gxpert installed	153	101	38	33	6	11	12	7	361
GxAlert installed	99	78	29	23	0	10	8	5	252
	64.7%	77.2%	76.3%	69.7%	0.0%	90.9%	66.7%	71.4%	69.8%

Mapping of GeneXpert sites:

All GeneXpert sites in Pakistan are mapped in google map and can be accessed at https://ntp.gov.pk/locations-of-genexpert-sites-in-pakistan/

Challenges:

- Presumptive TB cases tested on microscopy are higher compared to those on Xpert but focus on quality of microscopy services is gradually weakening.
- With introduction and scale up of Xpert, proportion of presumptive TB cases tested upfront on Xpert are reported separately and thus not captured in comprehensive surveillance of presumptive identification and testing.
- There is no effective specimen transport system between BHU and microscopy centers and between microscopy centers and Xpert sites.
- Delays in data sharing by PTP/PRL including microscopy data and Xpert data not yet connected to GXAlert.
- Incomplete data recording of Xpert results in TB04,TB03

3.2. TB Laboratory Services for DR-TB

RMP resistant patients on diagnosis by Xpert are referred to PMDT sites for treatment enrollment. At time of registration a fresh sample is collected and referred to linked laboratory for DST.

3.2.1. TB Culture services:

TB culture and DST services are now provided by the 12 TB culture and 6 TB DST laboratories established in public sector and supported by The Global fund. Main purpose of culture performed remains treatment monitoring of patient on DRTB treatment. TB culture performed by public sector is almost static (approx. 60,000 cultures annually) for last three years (2017-2019). Culture volume increased in Sind (14K to 19K annually). Laboratory in GB is not yet functional.

3.2.2. TB DST Services:

In year 2019, a total of 6966 phenotypic DST were performed against 7350 in 2018 by three laboratories in public sector (4241) and two in private sector (2725). Of six planned DST laboratories in Public sector, , PRLs Punjab (two) and Baluchistan could not start phenotypic DST in 2019 due to issues related to infrastructure. A slight decline seen in total DST volume in 2019 was due to decrease in DST volume in public sector from 4578 in 2018 to 4241 in 2019. NRL continued to offer DST services for PMDT sites in Punjab besides those in ICT, AJK and FATA whereas TB laboratory in the Indus hospital provided DST services to selected PMDT sites in Sindh and Baluchistan.

3.2.3. Genotypic DST services (Line Probe Assay)

To facilitate DST based treatment decision, implementation of rapid DST using molecular DST (LPA) started in 2018. LPA was introduced in NRL in 2017 and plans to establish LPA services were implemented in the existing TB culture and DST laboratories. In 2019, four DST laboratories started LPA first line and two laboratories started second line DST.

3.3. National Reference Laboratory (NRL):

The core functions of NTBRL include Mycobacteriology testing services (routine and specialized), External Quality Assessment (EQA) of Drug Susceptibility Testing (DST) services, surveillance of drug resistance, human resource capacity development and technical assistance for quality assured services.

3.3.1. Mycobacteriology services:

NRL offers routine diagnostic services to presumptive TB patient referred by health facilities in ICT including Federal general hospital and also for patient from Rawalpindi district and other adjacent districts. Besides patients enrolled in PMDT sites ICT, AJK and GB, DST services are also provided to PMDTs in Punjab as DST services are not yet operational by PRLs-Punjab. Altogether in 2019, DST services were provided to patients enrolled in nineteen PMDT sites including eleven in Punjab. In year 2019, a total of 12531 patients were registered in NRL including 56.6% male and 7.6% children under 15yrs age. Among all referrals, 91.0% (11400) were pulmonary, 7.8%(1044) extra-pulmonary and 0.7% (87) had both pulmonary and extra-pulmonary disease.

TABLE 31. Workload of National TB Reference Laboratory (by province/region) during 2019

	Patient Registered	Samples Processed	Test performed	AFB Smear	GenXpert	Culture	gDST (LPA)		pDST
							FL	SL	
Pakistan	**12,531**	**16,263**	**42,265**	**15,274**	**9,667**	**11,023**	**2,636**	**1,572**	**2,093**
ICT	5,890	6,671	16,941	6,631	5,952	3,825	239	88	206
AJK	185	386	861	385	92	318	27	22	17
GB	12	33	69	33		33	1	1	1
PJB	6,282	9,010	23,689	8,063	3,622	6,666	2,236	1,336	1,766
KP	162	163	685	162	1	161	133	125	103

3.3.2. DST services:

NRL is offering drug susceptibility testing since 2009 for clinical management and surveillance purpose. With the introduction of GeneXpert in 2011, most of the referral for DST (phenotypic DST/Line probe assay) are patient detected as Rifampicin resistant on Xpert. In 2019, total phenotypic and genotypic DST performed was 2623 including 89.9% from PTB and 10.1% were EPTB cases. Among DST performed, 4.8% were CHTB cases. As a no EPTB and a very few CHTB were included in DRS conducted in 2012-13. DST is performed regardless of RMP result for surveillance of drug resistance in pediatrics and extra-pulmonary specimens.

3.3.3. EQA by proficiency testing for DST services:

Annual EQA scheme is organized by WHO collaborating centre in Antwerp Belgium (SRL). Proficiency testing is assessed of participating laboratories for First line drugs (Rifampicin, Isoniazid, Ethambutol, Pyrazinamide, streptomycin) and second line drugs (Levofloxacin, Moxifloxacin, Amikacin, Capreomycin and Kanamycin). In line with WHO new recommendation for DRTB treatment, Bedaquiline, Clofazamine, Linezolid and Delamanid are included in PT scheme for DST for first time.

Since 2009 NRL is regularly participating and has sustained its proficiency for first and second line drugs including 24th round of panel testing conducted in 2018. Besides NRL, two laboratories AKU (SRL) and IHK regularly participate in EQA scheme. Both laboratories have also sustained proficiency for FLDST and SLDST. In Dec 2019 NRL received panel for 25th round which was reported in 2020 and results are not yet announced.

3.3.4. National EQA scheme for DST:

A National EQA scheme for DST is organized by NRL for DST laboratories in country since 2009. Panel are prepared by sub-culturing panel strains received from SRL and are sent to TB laboratories public and interested private sector laboratories. In year 2018, two public sector laboratories (PRL KPK and Sindh) qualified in DST for both first and second line DST and two out of three private sector laboratories qualified in proficiency testing for first line DST.

3.3.5. Surveillance of Drug Resistance:

All data pertaining to core TB drugs is collected for surveillance of drug resistance including Rifampicin, and Fluoroquinolone. New and repurpose drugs are now added to surveillance program. Annually all GeneXpert data is collected from all Xpert sites for rifampicin and DST data is collected from provincial TB reference laboratories, The Indus hospital and AKU TB laboratory for analysis of drug resistance pattern stratified by provinces.

a) Universal DST and Rifampicin Resistance; For monitoring of this indicator the data need to be collected from TB register. However, problem are still encountered with regard to completeness of data entry and Rifampicin testing and resistance.
b) Fluoroquinolone resistance in RR/MDR:

FQ resistance is one of the core drug in management of DRTB. Pakistan has high level of FQ resistance compared to global trend. A gradual decline is seen in FQ resistance compared to previous five years, in 2019 across all provinces. Table below is showing trend of FQ resistance in provinces. Among all provinces a lowest FQ resistance was reported in KP in 2019, but trend of lower FQ resistance is noted in Sindh province compared to other provinces.

TABLE 32. National trend of FQ resistance in RR/MDR TB cases (by province/region) in Pakistan

	Laboratory		**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
			PTB	PTB	PTB	PTB	PTB+EPTB	PTB+EPTB	PTB+EPTB
National		DST(N)	2213	2359	2292	2363	2862	2892	2389
		FQr(n)	1121	1114	996	1126	1104	1141	894
		FQr(%)	**50.7%**	**47.2%**	**43.5%**	**47.7%**	**38.6%**	**39.5%**	**37.4%**
Punjab +ICT+ Allied	NRL	DST(N)	269	623	894	1065	1255	1453	1293
		FQr(n)	127	315	475	564	604	668	560
		FQr(%)	**47.2%**	**50.6%**	**53.1%**	**53.0%**	**48.1%**	**46.0%**	**43.3%**
KP	PRL KP	DST(N)		70	189	158	312	318	230
		FQr(n)		31	77	59	154	119	56
		FQr(%)		**44.3%**	**40.7%**	**37.3%**	**49.4%**	**37.4%**	**24.3%**
Sindh	PRL-Sindh & TIH	DST(N)	380	755	971	1033	1178	981	733
		FQr(n)	135	272	327	443	375	292	223
		FQr(%)	**35.5%**	**36.0%**	**33.7%**	**42.9%**	**31.8%**	**29.8%**	**30.4%**
B'tan		DST(N)						40	51
		FQr(n)						10	16
		FQr(%)						**25.0%**	**31.4%**
Total	**AKU**	**DST(N)**	**1564**	**911**	**238**	**110**	**117**	**100**	**82**
		FQr(n)	859	496	117	61	71	52	39
		FQr(%)	**54.9%**	**54.4%**	**49.2%**	**55.5%**	**60.7%**	**52.0%**	**47.6%**

Emerging resistance to new and repurpose second line drugs - Surveillance for acquired drug resistance to Bedaquiline:

NRL in collaboration with SRL –Milan conducted a two-year surveillance project funded by WHO (HQ) for acquired drug resistance to BDQ and CFZ. Sequential clinical isolates from patients enrolled on BDQ containing regimen were tested for BDQ and CFZ pDST and WGS (baseline and at least one follow up culture). This project closed out in 2019 and first six cases of acquired BDQ resistance were published in July 2019. (PMID; 31262765).

During project NRL developed capacity for Phenotypic DST of BDQ in MGIT and BDQ- DST for surveillance of primary and acquired drug resistance was started in 2019. NRL continue to offer BDQ testing for identification of acquired drug resistance to all patients till capacity is established at provinces. In year 2019, New and repurpose drugs were included in DST panel for all clinical isolates processed at NRL. Altogether more than 900 RR and RS clinical isolates were tested. The strains reported resistant on MGIT will be sent to Milan for sequencing for confirmation of phenotypic results.

3.3.6. Human Resources Capacity Development

NRL organizes trainings for culture and DST laboratories staff and Training of Trainers (TOT) of basic training organized by PRL. Basic microscopy/Xpert training for 40 staff from AJK, GB and FATA and culture and DST training for 15 laboratory staff from across country was organized by NRL in 2019.

3.3.7. Technical support:

Guideline/SOP development: In 2019 NRL developed manual for processing pulmonary and extra-pulmonary specimen for Xpert testing for diagnosis of TB and drug resistant TB. (accessible at https://ntp.gov.pk/resource-center/).

GXAlert Support Desk: A support desk at NRL, provide ongoing support for implementation of deployment plan, activation of router, distribution, installation, trouble shooting and coordination with provinces and technical team of 'SystemOne.

Procurement and supply management of Laboratory items and supplies: Active Technical support was provided for i) technical evaluation of bids and quotes for local and international procurement of laboratory items ii) Inspection of laboratory supplies on delivery (Local and International) and distribution and supply management of laboratory items.

Onsite technical support: Onsite technical support and supervision was provided by staff on seven different occasion.

- Despite a demonstrated performance in diagnostics for TB, the TB lab services still facing challenges like lack of international standard bio availability/ bio equivalence (BABE) laboratory testing facilities, low geographical coverage and sub optimal use of GeneXpert coupled with mismatch between scale up of Xpert machines and provision of HR from the existing public sector staff.

CHAPTER 4. INTEGRATED ROLE OF COMMON MANAGEMENT UNIT (CMU):

Since 2019, the Global Fund established a Common Management Unit in Pakistan for AIDS, TB and Malaria to consolidate following four functions and to avoid overlapping of activities/resources;

- M&E and Surveillance
- Operational Research
- PSCM
- Internal Audit
- Global Fund Grant Management

Common Management Unit (CMU) has a unique positioning under Ministry of National Health Services, Regulations & Coordination (MNHSR&C) for sector-wide approaches in complex vertical disease control of three programs namely TB, HIV/AIDS and Malaria and therefore works in close coordination with National Tuberculosis Program (NTP), National Aids Control Program (NACP) and Directorate of Malaria Control (DoMC).

4.1. Monitoring & Evaluation and Surveillance

Monitoring and Evaluation (M& E) is a vital component of performance-based funding, hence one of the key function of the Global Fund country grant management. Simple, implementable monitoring and evaluation (M&E) systems that adhere to field practicalities and offer a set of accepted best practices are crucial to persistently improve program performance and ensure effective grant execution. The key strategic pillar of M& E system is to help accelerate specific program efforts in strengthening service delivery systems by addressing major limitations and offering timely, innovative and concrete solutions.

The CMU-Monitoring & Evaluation/Surveillance unit takes lead in M & E planning, surveillance capacity building, data quality assessment, data utilization, operational research with dedicated research unit and ensuring effective decisions in policy framework processes. Timely implementation of action plan suggested by M & E department helps programs and other stakeholders to institutionalize mechanisms for strengthening the use of information at both national and sub-national levels.

M&E processes under CMU assist programs in evaluating performance and identifying the factors which contribute to their service delivery outcomes. It provides evidence-based planning for resource allocation decisions and helps identify how challenges should be addressed and success replicated.

4.1.1. Goal

To establish a robust and sustainable M&E and surveillance system contributing to the elimination TB, HIV/AIDS and Malaria from Pakistan.

4.1.2. Key Outputs

The expected key outputs of the brief are;

- Prepare an M&E Action Plan for short- and medium-term
- A functional robust, comprehensive, and well-coordinated M&E system exists under CMU
- Regular updates on performance indicators is available and team is well aligned
- Implementation progress reports are produced on time through DHIS-2 and ART MIS
- Data sources outside the routine DHIS-2 and ART MIS are available e.g periodic surveys, annual reports and end term reviews.

4.1.3. Key Outcomes

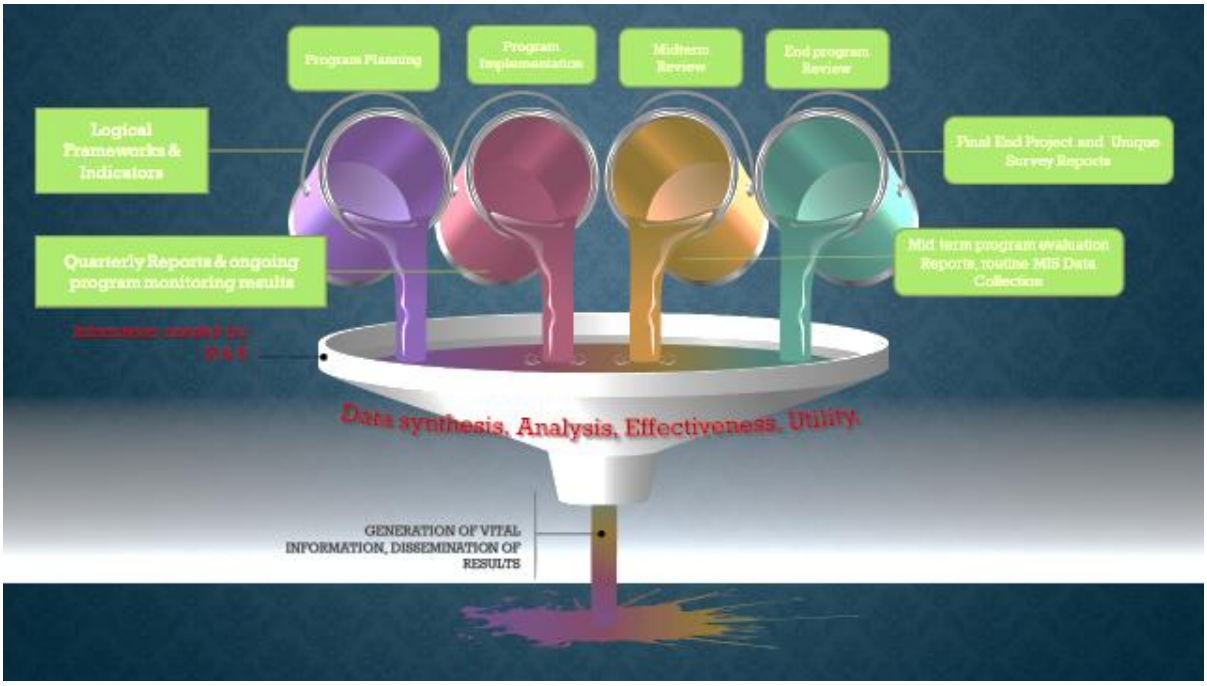
The brief will serve as a guiding document for revision of existing M & E plan for CMU to:

1. Develop and implement National M & E plans for TB, HIV-AIDS and Malaria.
2. Monitor PR/SR activities and provide technical support for M & E to the provinces and other SRs.
3. Monitor quarterly surveillance meetings at national, provincial and districts levels for data collection and validation.
4. Provide technical support for development of M&E plan for Principal Recipients (PRs), Sub-Recipients (SRs) and other implementing partners.

4.1.4. Primary Functions of Unit:

1. Disease specific M&E
2. Data: collection and dissemination of disease specific data
3. Development, Implementation & scale up of DHIS-2 system for three diseases.
4. Capacity building of staff to deal all the three systems.

4.1.5. M & E Program Cycle Overview



4.1.6. The Data Sources-Multiplicity

- Service Delivery Data
- Administrative Records
- Monthly Reports; Field Visit Plans
- Performance Update Disbursement Report (PUDR); Quarterly Reports

- Annual Reports; TB, HIV/AIDS, Malaria
- Survey Reports

The M&E and Surveillance component comprises of four functions viz; M&E, Data, IT, MIS and DHIS2.

4.1.7. M&E Section - JPRM mission --11-19 February 2019:

The Joint Program review was held which covered all the programmatic areas of all the provinces. The key recommendations were summarized as:

- Increase Government allocation to health and TB
- Develop a new TB NSP with sets of prioritized interventions
- Establishing a National multi- sectoral technical committee
- Progressively involve lower levels of the health care system including BHUs, dispensaries and MNCH centres, and the Lady Health Care workers (LHWs)
- To reach the large number of clinicians that need to be trained, the N/PTPs are advised to explore innovations such as digital technologies (m or e -health) to deliver this training
- The sample transportation system between BHUs and BMUs should be established
- Enhance contact screening
- Preventive treatment for LTBI must be strengthened & recorded
- The yield and cost-effectiveness of TB mass-screening undertaken by the NGOs needs to be evaluated
- Decentralize management of DRTB from PMDT sites to the district level
- Improve access to PMDT services through establishment of PMDT sites managed by the public sector
- Update national guidelines on RR-TB treatment regimens to the new WHO recommendations issued in March 2019
- All patients with presumptive TB and those who have been diagnosed with TB are tested for HIV
- All PLHIV should routinely be screened for TB
- Implement in a sustainable way, bi-directional screening of TB and diabetes
- N/PTPs and partners should increase the proportion of private primary care providers engagement from <5% to >20% within 3 years
- The MoNHSRC should encourage Provincial Health Secretaries to instruct all public tertiary care hospitals to appoint dedicated TB- DOTS teams
- PPM partners should develop digital technologies to facilitate PP engagement at scale
- The NTP should reconsider objectives and plans for the mandatory notification pilot project
- The NTP should negotiate with IMS/IQVIA for access to quarterly information on private sales of anti-Drugs
- Scale up the integration of TB into LHW program to support community-based activities
- Nurture and promote engagement of affected communities as a powerful strategy to raise TB awareness and reduce stigma in the society
- Enforce the regulation to restrict TB drug sales without prescription
- Ensure quality-assured TB drugs available in the country
- The N/PTPs should continue to strengthen program based operational research to support policy and practice recommendations to End TB in Pakistan

4.1.8. CCM oversight monitoring visit (17-19 June 2019) at district Loralai, Pishin & Quetta:

Epidemiology of TB at the provincial level to help in addressing the province specific challenges, since Baluchistan dynamics are entirely different than other provinces. Sputum transportation mechanism needs to be strengthened. Overall Provincial TB response needs to be linked with non GF partners especially PPHI. Since 100% TB medicine for childhood TB patients is being provided by GF, PTP shall not allocate funds for this purpose. District Health Committee/DHMT should add an agenda item of TB progress/issues as regular feature of monthly meetings. HR trainings /refreshers are required. Extension in numbers of PMDT sites at divisional level. Follow up on summary submitted to declare TB as notifiable disease. Issue of over the counter sale of TB drugs needs to be addressed through M/o NHSRC & DRAP. Staff deputed on TB clinics should be under direct reporting to PTP. PPM needs to be enhanced. Pictorial BCC leaflets may be produced for patients reporting at the TB/GPs clinics. PTP and Department of Health should follow the case for TB as notifiable disease. Front line healthcare workers at BHU level (LHV, paramedic) should be engaged for patient's referral and awareness raising

4.1.9. Data Section:

The data management unit of CMU is responsible to ensure that the surveillance data is timely received, reviewed and analyzed from the provincial programs of the three diseases and the reports are shared with Ministry of Health, Pakistan Bureau of Statistics, World Health Organization and other national and international partners. In addition to the routine surveillance activities, data unit conducted/ supported following activities during 2019.

1. TB Epidemiology Review conducted (January 2019)
2. People Centered TB Workshop conducted (January 2019)
3. Joint External TB Program Review (February 2019)
4. Consultative meetings for development of DHIS2 road map (March & August 2019)
5. First ever international Subnational TB hackathon conducted to model district wise TB prevalence for all districts of Pakistan with support of Royal Tropical Institute (KIT) Amsterdam (May-November 2019)
6. Online data compilation for W.H.O Global TB Report 2019
7. Training of PMDT site staff on revised R&R tools conducted (June 2019)
8. First Data Analysis Workshop conducted supported by WHO (July 2019)
9. Workshop on Decentralization of PMDT to district-level (July 2019)
10. Piloted study on Electronic Case Based Surveillance of Active Case Finding in Pakistan with support of Royal Tropical Institute (KIT) Amsterdam (August 2019)
11. Participation in development of National Strategic Plan for 2021-23 (September 2019-January 2020)
12. Revision of R&R and tools for TB (October, 2020)
13. Modelling of Revised NSP 2021-23 (September 2019-January 2020)

4.1.10. IT Section:

CAD4TB is an electronic device that takes frontal chest radiograph as input. The output includes an assessment of the input image, a heat map indicating areas with possible abnormalities, and an output score between 0 and 100 related to the likelihood that the X-ray subject has tuberculosis (TB).

During the year 2019 CAD4TB devices and been procured and deployed on the following stations across Pakistan;

1. Holy Family, Rawalpindi
2. DHQ, Sheikhupura

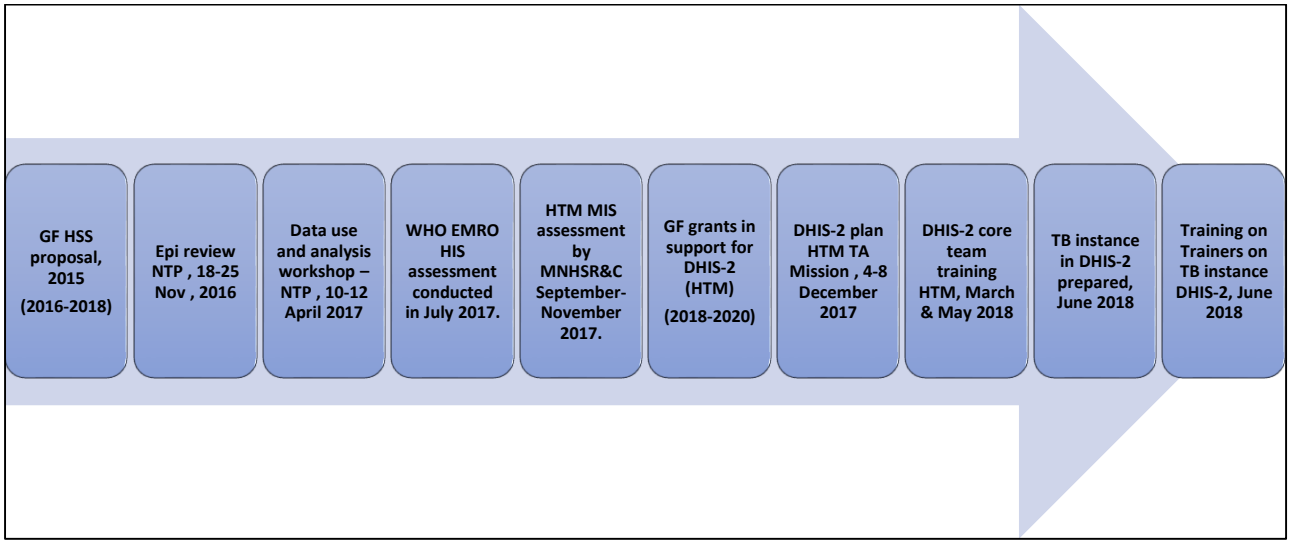
3. Bahawalpur Victoria Hospital, Bahawalpur
4. THQ, Pabbi
5. Civil Hospital, Swat
6. Civil Hospital, Mirpur Khas
7. Jacobabad Institute of Medical Sciences, Jacobabad
8. DHQ, Khuzdar

4.1.11. DHIS2:

DHIS 2 is a tool for collection, validation, analysis, and presentation of aggregate and patient-based statistical data, tailored (but not limited) to integrated health information management activities. It is a generic tool rather than a pre-configured database application, with an open meta-data model and a flexible user interface that allows the user to design the contents of a specific information system without the need for programming.

Pakistan is one of the prioritized countries by WHO. Global Fund and partners for the implementation of DHIS-2 online reporting system. The activities regarding the transition from the manual excel based reporting system to the online DHIS-2 reporting system started during mid-2016. TB Epidemiology review of National TB Control Programme, Pakistan was conducted in November 2016 by WHO global TB Program and has proposed DHIS-2 replacing the paper & excels based system. A joint mission to MoNHSR&C, National TB control program, National AIDS control program and Directorate of Malaria control was conducted by WHO, Global Fund and University of Oslo to review the surveillance systems of programmes and to integrate them on a common platform using DHIS2 (December 2017). It was recommended and agreed by all programmes to use DHIS2 for reporting of surveillance data and common dashboard.

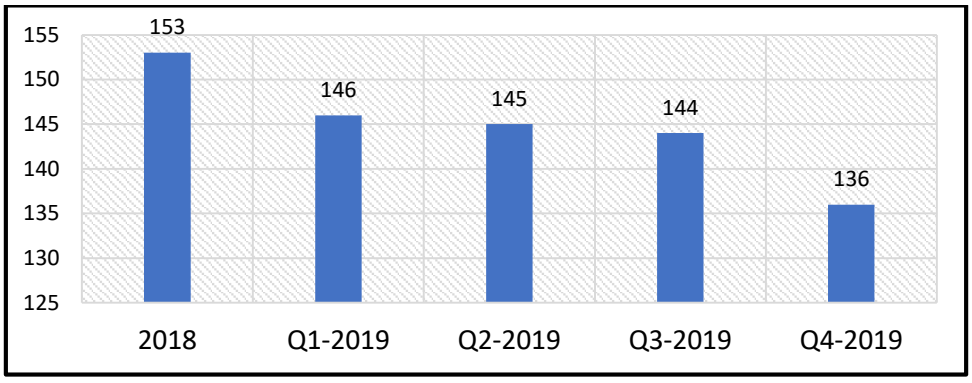
FIGURE 31. The Chronology of DHIS expansion till 2019



Following are the achievements that have been made in the road to implementation on DHIS-2.

1. Core team trained on DHIS2 (TB, HIV, Malaria, NIH, Ministry & partners)
2. Development of TB instance (aggregate system)
3. Development of Malaria instance
4. Local training: end user training
    a. 533 Health care workers are trained on TB DHIS-2 forms in 153 Districts
    b. 284 Health care workers are trained on Malaria DHIS2 forms in 72 Districts
5. Integration of TB, Malaria & HIV instance
6. Integrated TB, HIV and Malaria dashboards available
7. International capacity building on tracker system in Sri Lanka (04 participants)
8. Development of tracker system for TB
9. TB Mandatory case notification has been started in 5 district (2 KP & 3 Sindh) through DHIS-2 Tracker application.
10. Detail population estimates (based on 2017 census) has been entered from 2017-25
11. Indicators of TB, HIV & Malaria have being updated according the WHO standard

FIGURE 32. District reporting status of DHIS-2 in Pakistan



The M &E department will focus on following strategic issues to help accelerate efforts of NTP, NACP and in strengthening performance systems.

4.1.12. Coordination and Harmonization

The most obvious characteristic in relation to M&E is the bifurcation of functions among different programs, which calls for better coordination and harmonization. Substantial improvements can be achieved from streamlining and rationalizing M&E requirements and activities that currently differ in terms of formats and cross program information sharing. In particular, it will be important that there is congruence and synergy between CMU-M & E department and national PR program implementers. It is intended to enhance coordination among program, relevant stakeholders and GF.

4.1.13. Effective Contribution to Results

M&E assessment, learning and activities are intended to be robust and sustained. To strengthen the outcomes, there is need to from an emphasis on processes and outputs. An immediate step would be to broaden the focus of monthly review meetings. Strengthened central coordination is needed for setting standards for output.

4.1.14. Data Quality Assurance

Data quality assurance processes will include more vigorous periodic Data Quality Audits of recorded data by supervisors, bringing provincial programs on use of DHIS 2 and ART MIS,

regular training of staff, and provision of routine feedback to staff at all levels on completeness, reliability and validity of data and dissemination of results at different levels. Whilst the quality and reliability management of survey data are already established, M&E officers will work with the MISs to review routine data systems periodically using standard techniques in collaboration with other technical team members.

4.2. Operational Research

Research is a key strategic area and core component identified in Pakistan's National strategic and operational (PC1) plans as well as in the new WHO END TB strategy (pillar III). In 2009, a research unit at the National TB Program (NTP) was developed and became fully functional with the aim of designing and conducting locally relevant operational research.
Objectives of Research unit are as follows:

- To develop Institutional collaborations and research networks both at national & international level.
- Capacity building activities of NTP/PTP staff (TB, Malaria and HIV/AIDs) & other organizations on operational research including data management and analysis through international research course The Structured Operational Research and Training Initiative (SORT IT).
- To Generate High Quality evidence through research article publications in International Peer Reviewed Journals and to ensure positive policy impacts.
- To Participate and represent Pakistan at national and international forums on research implementation process and results disseminations for knowledge sharing and to provide guidance for other countries based on success model.

The research unit has an honor to conduct the international SORT IT course in Pakistan and also done several research projects and national level surveys on priority programme needs. This include disease burden studies for measurement of TB transmission i.e. National TB Prevalence Survey, 2010-11[1] and two national inventory studies to measure the under-reporting of TB cases among adults[2] & children. Some projects based on intensified case finding using innovative strategies are also conducted i.e. conducting chest camps[3] & engaging private providers, examined effectiveness of widening the circle of contact screening in increasing TB case detection using GIS[4] and conducted a MDR trial to assess effectiveness and feasibility of 2 months hospitalization vs 1 week hospitalization for MDR-TB in Pakistan.
NSP Objective against which the progress to be measured:

- Build supportive structures for surveillance, research, and innovations at national and provincial levels.
- Identify and prioritise research gaps.
- Strengthen research capacity building at the local level including National and Provincial level.

[1] Qadeer E, Fatima R, Yaqoob A, Tahseen S, Haq MU, Ghafoor A, Asif M, Straetemans M, Tiemersma EW. Population based national tuberculosis prevalence survey among adults (> 15 years) in Pakistan, 2010–2011. PloS one. 2016 Feb 10;11(2):e0148293.
[2] Fatima R, Harris RJ, Enarson DA, Hinderaker SG, Qadeer E, Ali K, Bassilli A. Estimating tuberculosis burden and case detection in Pakistan. The International Journal of Tuberculosis and Lung Disease. 2014 Jan 1;18(1):55-60.
[3] Fatima R, Qadeer E, Enarson DA, Creswell J, Stevens R, etal. Success of active tuberculosis case detection among high-risk groups in urban slums in Pakistan. The International Journal of Tuberculosis and Lung Disease. 2014 Sep 1;18(9):1099-104.
4 Fatima R, Qadeer E, Yaqoob A, ul Haq M, Majumdar SS, Shewade HD, Stevens R, Creswell J, Mahmood N, Kumar AM. Extending 'Contact Tracing'into the Community within a 50-Metre Radius of an Index Tuberculosis Patient Using Xpert MTB/RIF in Urban, Pakistan: Did It Increase Case Detection?. PloS one. 2016 Nov 29;11(11):e0165813.

- Share research evidence and emerging best practices to strengthen policy and practices.
- Strengthen the stewardship role of governments at all levels for research and knowledge management systems.
- Build institutional capacities to promote, undertake and utilize research for evidence-based policy-making in health at all levels.
- Establish health information exchanges to make up-to-date data widely available eg on NTP Website.

4.2.1. Achievements (2019)

1. *Successful completion of Fourth cohort of Pakistan Structured Operational Research and Training Initiative course (SORT - IT):* Research Unit has honor to conduct the international Structured Operational Research and Training Initiative (SORT IT) course at Pakistan under the joint collaboration of WHO TDR and Global Fund at national level since 2016. Though this initiative, till now 50 research papers are published in international peer reviewed journals available at NTP website https://ntp.gov.pk/resource-center/ and 21 institutions engaged. This initiative is also acknowledged in TDR Global profile for research capacity strengthening through SORT-IT as unique example in the world https://www.who.int/tdr/capacity/alumni/razia-fatima/en/ and highlighted in recent publication Global Health Action[5]. Through this initiative, participants from various health programs are successfully trained i.e. National & provincial TB, malaria and HIV/AIDs program, National Institute of Health, Pakistan Health Research Council, Médecins Sans Frontières (MSF) Pakistan , Health Services Academy and other research institutions. Various topics on TB ranging from TB diagnostic, active case finding, TB in prisons, public private mix, MDR and comorbidities associated with TB along with other topics such as HIV surveillance , Malaria surveillance , Maternal and child health, Hepatitis , Measles etc. In 2019 cohort, 9 important manuscript are submitted in international journal on quality assessment of microbiology laboratories, Diagnostic accuracy of Xpert, Loss to follow up trends of HIV patents, Sero-prevalence of Measles Antibodies among children (18-24months), Prevalence of tuberculosis and its associated factors among the prisoners, Utilization of Upfront Xpert MTB/RIF Testing, Prevalence and associated risk factors of HIV & Others infectious pathogens among injecting drug, Evaluation of LLINs distribution in control of Malaria, and Effect of missed appointment tracing system on loss to follow up of chronic Hepatitis C patients .

2. *Establishment of IRB CMU Institutional Review Board:* CMU Institutional Review Board was established in 2018 to facilitate researcher to provide free and accessible platform to review of their research proposals The IRB committee in CMU serves as an oversight committee, governed by board with the purpose of protecting and managing risk to participants involved in research and protect the rights and welfare of human research subjects recruited to participate in research activities. These regulations specifically apply to federal and provincial research in TB, Malaria, HIV/AIDS program specifically imply that all research conducted should meet the same standard. Under this initiative, 10 research proposal were reviewed and granted approval.

[5] Fatima R, Yaqoob A, Qadeer E, Hinderaker SG, Heldal E, Zachariah R, Harries AD, Kumar AM. Building sustainable operational research capacity in Pakistan: starting with tuberculosis and expanding to other public health problems. Global health action. 2019 Jan 1;12(1):1555215.

3. *Protocol Development Workshop "Assessment of clinically diagnosed Tuberculosis":* In light of recommendation and top priority mentioned in recent JPRM report and considering the importance of TB Clinical Diagnosis, Protocol Development Workshop on "Assessment of clinically diagnosed Tuberculosis" was conducted on October 7 – 8, 2019 Hotel Ramada, Islamabad, Pakistan. Barend Gerretsen & Christina Mergenthaler from KIT Royal Tropical Institute facilitated the workshop. Protocol was discussed and finalized in mutual consensus with country technical experts i.e. National & Provincial TB Control Program, Agha Khan University and private PRs from Indus Hospital, Mercy Corp, ASD & Green Star, USAID and MoNHSR&C,

4. *A multi-country double blinded placebo controlled trial on "Tobacco cessation within TB programmes settings:* Research Unit led a multi-country double blinded placebo controlled trial on "Tobacco cessation with TB programmes: A real world solution for countries with dual burden of disease" in collaboration with University of LEEDs. This trial was initiated in Nov, 2015 and completed recently through 20 consortium members. The first dissemination of trial results and group work of multiple stakeholder for country scale-up is planned on 17 Sep, 2019. The recently concluded trial, conducted as per international standards in approx. 2,500 TB patients in Pakistan and Bangladesh, has shown that smokers receiving the behavioral intervention package in both arms achieved approx. 30% quitting rate after six months and 25% after 12 months and improved treatment outcome of 90%. In Call to Action session during the above technical workshop, revision TB reporting tools to include 3 measures of i) tobacco status, ii) advice and iii) quite at 6 months are proposed by incorporating in DHIS2 across country which is piloted in KP province.

5. *Piloted the TB and Diabetes Guidelines in Pakistan in collaboration The Union:* Bi-directional screening is planned in collaboration with World Diabetes Foundation with aim to scale up across country. The TB and Diabetes Guidelines was piloted in Pakistan in collaboration The UNION available at https://tbsouthafrica.org.za/resources/union-management-diabetes-mellitus-tuberculosis-guide-essential-practice.

6. *Collaboration with national & international organization:* Developed successful collaboration between various international institutions i.e. London School of Hygiene & Tropical Medicine, University of YORK, University of LEEDs, University of Edinburgh, University of Bergen, University of California & University of John Hopkins and national institutions / health programs which include National Institute of Health, Pakistan Health Research Council, Health Services Academy, Quaid-i-Azam University, Institute of Psychology, Islamia University Bahawalpur, University of Sargoda and Arid Agriculture University.

4.2.2. Challenges:

1. Limited Human resource in operational research at National and Provincial level
2. Limited financial resources. Need finances for important surveys (patient cost survey & pilot TB Screening in marginalized population) research priorities in Pakistan.
3. Operational difficulties in implementing surveys in areas with natural disaster and effected with law and order.

4.2.3. Way Forward:

- Implementation of Pakistan SORT IT course in 2020
- Publication on "Effectiveness and feasibility of 2 months hospitalization (hospital based) and 1 week hospitalization (community-based delivery of care) for multi-drug resistant tuberculosis (MDR-TB) in Pakistan: A randomized controlled trial".
- Ten more international Publications are in pipeline from SORT IT course 2019 leading to policy changes and effective communication to exchange evidence.
- To collaborate further with National university institutions such as Rawalpindi medical university, SZABMU etc.

4.3. Procurement and Supply Chain Management (PSCM):

4.3.1. Background:

PSCM Unit at NTP ever since its establishment in year 2010 is performing its zealous services with utmost *transparency, competitiveness and uprightness* while conducting each of its activity delegated under the Global Fund Grant agreement. The unit ensures the application of all rules/ policies envisaged in the procurement manual while processing any minor or major in-country procurement. Alongside ensuring the rules application in all its procurements, PSCM Unit leaves no stone unturned in making timely forecasting, quantification and distribution of all commodities to provincial counterparts, PMDT sites, culture & DST laboratories spread all over the country.

4.3.2. In-country Procurements:

During the year 2019 PSCM Unit was able to process all the approved and planned procurements. Not only procurements were processed with due diligence and application of procurement guidelines but, with the regular follow ups with all the relevant internal stakeholders, PSCM unit was able to shoulder-off the liabilities in shape of payments against successful receipt of supplies / services which contributed to significant improvements in the overall burn-rate of the TB grant funds. The local procurements included (not limited to) *miscellaneous laboratory equipment, laboratory consumables, IT equipment and supplies, printing of miscellaneous program modules, kick-off of construction of combined warehouse for three disease programs, infrastructure up-gradations, Infection control supplies, HIV Rapid diagnostic Tests, stationary items, miscellaneous general items, miscellaneous services and TAs etc*.

PSCM Unit of NTP also provided on-job training and were easily accessible to field staff those manage procurement and supply chain. PSCM staff ensured all its support to field staff remotely, as well; and help provincial counter-parts in undertaking their budgeted procurements.

4.3.3. International Procurements:

Alongside successful management of in-country procurements in the year 2019, the devoted staff at PSCM Unit was also equally successful to manage all the approved and planned international procurements. These included *ATT drugs (First Line, Second Line and Paediatric drugs), Culture and DST laboratory equipment, Gene-Xperts, Culture and DST laboratory supplies etc*.

4.3.4. ***Supply Chain:***

Supply chain and logistics systems are one of the backbones of national health programs that strive to ensure the uninterrupted availability of quality health supplies, from the national level through to the service delivery points in rural and remote areas. Periodic (biannually) stock reviews are carried out by PSCM, to avoid expiries and shortage in supplies. PSCM NTP team works in coordination with the National and International stakeholders including Global Drug Facility (GDF), WHO to provide an oversight on the ATT drugs quantifications, forecasts, risks & challenges in the management of ATT drugs throughout the country.

4.3.5. ***PSCM Working Group:***

Keeping in view the coordination and other challenges including the critical need of timely and effective forecasting and quantification, a working group under the stewardship of PSCM-CMU was established in 2019, involving the Federal and Provincial PSCM teams, Technical / Policy Units and Finance. The aim is to meet the challenges and bring innovation for further improvement and efficiency in order to support the overall program service delivery in the country. Following are the main objectives of the PSCM working group:

- To overcome the challenges and bottlenecks in the area of PSCM operations in the country
- To bring innovation in PSCM operations
- To ensure effective forecasting and quantification for health products to ensure delivery of the right product, at the right time, in the right quantity, at the right cost, and of the right quality

The first working group meeting was held in Islamabad from 26-27 September 2019. The group benefited from views of three disease advisors and presentations of all participants from HIV/AIDS, T.B and Malaria.

4.3.6. ***Joint TB Program Review Mission:***

The International Consultant of Joint TB Program Review Mission (JPRM), visited Pakistan from February 11-23, 2019. The overall objective of this mission was to assess progress made in the implementation of the TB National Strategic Plan 2017-2020 and Pakistan's readiness to meet the commitments of the United National General Assembly political declaration on TB. The team visited all four provinces and the Islamabad Capital Territory. The JPRM team reported that;

Procurement and Supply Chain Management (PSCM) of all three-disease programs i.e. AIDS, Malaria and TB are combined and have unified functions under an integrated common unit, supported by the Global Fund. PSM functions of TB commodities are being managed by a dedicated team of professionals, managing demand generation, quantification, procurement, distribution and storage.

i. All medicines and supplies required for TB program management (FLDs, SLDs, new FLD and SLD pediatric formulation, medicines for the therapy of LTBI and laboratory commodities) are available in the country, including new drugs and diagnostics
ii. No major national stock outs were noted

iii. Early warning system at the national level using QuanTB exists to monitor drug stocks situation and supply planning
iv. Since the country has moved to a devolved system of health care including TB drug procurement, provinces are expected to co-finance and procure a portion of the provincial anti-TB medicine requirements. In 2018, 3 (Punjab, Sindh and Baluchistan) out of 4 provinces procured FLDs for adults from local suppliers
v. Provincial regulations exist to control the sales of TB drugs in private pharmacies by restricting sales without prescription

4.3.7. Implementation of the New Treatment Guidelines by WHO:

PSCM team in coordination with the technical/policy unit NTP, ensures the implementation of New Treatment Guidelines for DS & DR TB Patients as announced by WHO. NTP-Pakistan became the first country program globally where new regimen of Paediatrics ATT drugs were not only secured but with rigorous and prompt actions were able to guide the paediatricians all across the country, to use this newly introduced treatment regimen in paediatric TB treatment.

Similarly, New DR TB regimens 2017, 2018 & 2019 were implemented in the country. DS TB Guidelines 2018 were implemented in 2019 and treatment regimen CAT-II was stopped. National Advisories are circulated and where required trainings are also provided.

4.3.8. NTP Central Warehouse:

A strong warehousing network plays a vital role in the overall supply chain management of drugs and related programmatic needs in terms of different commodities and ultimately leads to success of every project/ program. Ever since, the existence of NTP, the warehousing needs are catered through rented warehouse spaces and currently, PSCM Unit is renting around 33,000 sq. ft. warehouse at central level to cater for the storage requirements of three-disease programs i.e. AIDS, TB & Malaria. However, during the grant making and negotiation for Global Fund-NFM Grant the PR-NTP successfully negotiated and secured funding for the construction of a purpose-built central warehouse measuring around 70,000 sq.ft. covered area and post successful open and competitive hiring process, the construction is underway under the supervision of M/s NESPAK (*the engineering consultants for this project*) and is expected to be completed by the end of year 2020. Given the role of central warehouse, during the year 2019 the efficient warehouse team with their assiduous services ensured timely and hassle-free receipts of all commodities (whether of import orders or local procurements) and post swift completion of all inventory pre-requisites processed all distribution plans to *provincial counter-parts, public/ private sub-recipients, PMDT sites spread all over the country and to wide-spread network of TB laboratories* and that too by adhering to best practices of warehousing and distribution.

4.3.9. Quality Assurance Monitoring & Evaluation visits to Provincial & District Warehouses:

PSCM Unit conducted Quality Assurance Monitoring & Evaluation visits to provincial, districts & BMU warehouses & extended not only valuable inputs for better warehousing practices but, also carried-out on job trainings for ATT drugs' handling, quantifying the need for the facility & usages of the DMIS tools & techniques. These visits also helped the field staffs to get acquainted with certain new techniques of managing stocks, their proper stacking, record keeping tools, temperature control requirements and application of FEFO rule. Also, the concerning staff at provincial public sector SRs, was given on job training to manage certain procurements, budgeted under their direct control, in an approved and structured way.

4.4. Managing Global Fund Grant

The main focus of NTP is at case finding and successfully treating the diagnosed cases of TB and Drug resistance TB. To achieve its targets NTP has been a path finder in developing partnerships and engaging private sector is a mile stone in its struggle for TB control in Pakistan. NTP is working with various technical and implementing partners, like WHO, USAID, IOM, NRSP, Pakistan Chest Society, Pakistan Pediatric Association, Mercy Corps, Indus Hospital Network, Greenstar social marketing, Pakistan Anti TB association and other national NGOs.

TB grants focusing on the private sector are implemented by two non-government PRs viz; IHN and MC. NTP is responsible for the public-sector component of the GF TB grant.

Pakistan commits to end the TB epidemic by 2030 as envisaged in the Agenda 2030 for Sustainable Development and its Sustainable Development Goals (SDGs), the World Health Organization (WHO) End TB Strategy, and the Stop TB Partnership Global Plan to End TB 2016-2020.

The funding landscape for TB control in Pakistan is mainly during 2018-2020 was supported by the Global Fund, augmented by public sector funding from provincial PC-1s and TB REACH projects in private sectors as given in the following tables;

TABLE 33. The Global Fund support for TB control (by PRs) in Pakistan during 2018-2020

Budget heads	Global Fund Support (by PR)								
	NTP			MC			IHN		
	Jul, 2018- Jun 2019	Jul, 2019- Jun 2020	Avg. Exp 2019	Jul, 2018- Jun 2019	Jul, 2019- Jun 2020	Avg. Exp. 2019	Jul, 2018- Jun 2019	Jul, 2019- Jun 2020	Avg. Exp. 2019
Lab infrastructure, equipment and supplies	2,091,356	6,018,744	4,055,050	491	1,031,973	516232	2,659,382	3,985,521	3,322,451
NTP staff (central unit staff and subnational TB staff)	3,977,075	10,244,609	7,110,842			0	3,700,279	5,144,150	4,422,215
DS-TB: drugs	6,286,233	468,306	3,377,270			0	312,561	55,250	183,906
DS-TB: programme costs	5,901,956	4,505,947	5,203,951	928,434	1,461,812	1195123	1,405,622	2,203,682	1,804,652
DR-TB: drugs	10,786,351	2,674,438	6,730,394			0	-	0	0
DR-TB: programme costs	46,410	50,000	48,205			0	704,815	979,838	842,327
Collaborative TB/HIV activities	18,593	93,763	56,178			0	-	0	0
Patient support	231,537	1,545,872	888,705			0	99,030	153,124	126,077
Operational research and surveys	10,747	18,009	14,378			0	-	0	0
All other budget lines for TB (Includes Office related costs, communication and ICR)	229,497	465,151	347,324	2,630,586	4,312,502	3471544	3,238,929	4412,129	3,825,529
Total	**29,579,754**	**26,084,838**	**27,832,296**	**3,559,511**	**6,806,287**	**5,182,899**	**12,120,617**	**16,933,694**	**14,527,155**

PC-1 support from provincial public sector for TB control in Pakistan during 2018-2020

Budget Heads	PC-1 Support by Provinces/Regions								
	Punjab			Sindh			KP		
	Jul, 2018 – Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019	Jul, 2018-Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019	Jul, 2018-Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019
Lab infrastructure, equipment and supplies	183,871	135,484	159,677	0	0	0	0	0	0
NTP staff (central unit staff and subnational TB staff)	68,542	244,690	156,616	383,379	899,229	641,303.8	162,998	76,120	119,559
DS-TB: drugs	767,742	1,372,142	1,069,942	412,050	292,429	352,239.3	0	0	0
DS-TB: programme costs	16,510	73,490	45,000	0	0	0	0	0	0
DR-TB: drugs	-		-	0	0	0	0	0	0
DR-TB: programme costs	-		-	0	0	0	0	0	0
Collaborative TB/HIV activities	-		-	0	0	0	0	0	0
Patient support	-		-	0	0	0	0	0	0
Operational research and surveys	-		-	0	0	0	0	0	0
All other budget lines for TB (Includes Office related costs, communication and ICR)	133,284	109,677	121,481	103,671	177,143	140,407	44,275	38,455	41,365
Total	**1,169,948**	**1,935,484**	**1,552,716**	**899,100**	**1,368,800**	**1,133,950**	**207273**	**114,575**	**160,924**

TABLE 34. TB REACH support during 2018-2020

Budget Heads	TB REACH Support								
	MC			Bridge Foundation			Dopasi Foundation		
	Jul, 2018-Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019	Jul, 2018-Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019	Jul, 2018-Jun 2019	Jul, 2019-Jun 2020	Avg. Exp. 2019
Lab infrastructure, equipment and supplies	-	0	0	-	-	0	1,755	3,502	2628.5
NTP staff (central unit staff and subnational TB staff)	-	0	0	36,500	52,568	44534	-	-	0
DS-TB: drugs	0	0	0	-	-	0	-	-	0

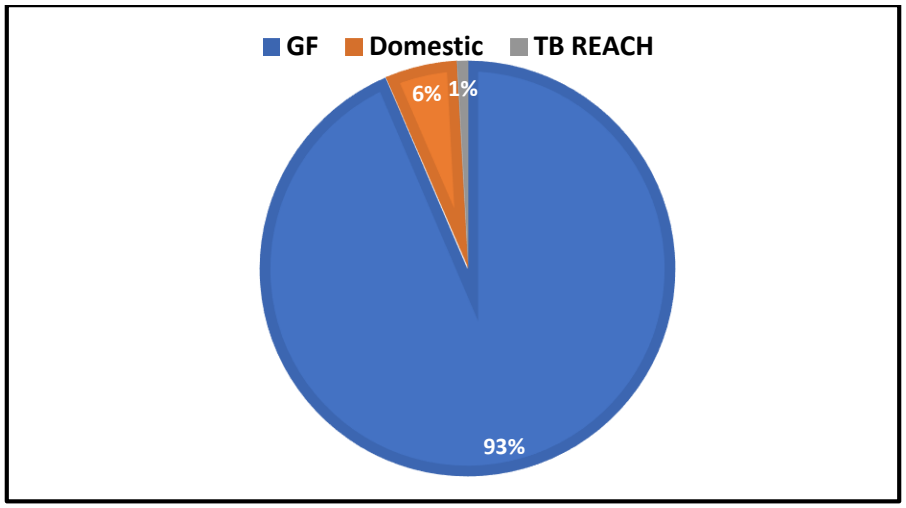
DS-TB: programme costs	55,210	0	27605	-	-	0	-	-	0
DR-TB: drugs	0	0	0	-	-	0	-	-	0
DR-TB: programme costs	0	0	0	-	-	0	-	-	0
Collaborative TB/HIV activities	0	0	0	-	-	0	-	-	0
Patient support	0	0	0	42,780	42,780	42,780	73,591	119,183	96,387
Operational research and surveys	20,424	0	10,212	3,000	10,440	6720	-	5,806	2,903
All other budget lines for TB (Includes Office related costs, communication and ICR)	41,336	0	20,668	23,550	28,705	26,127.5	119,156	181,837	150,496.5
Total	**116,970**	**0**	**58,485**	**105,830**	**134,493**	**120,161.5**	**194,502**	**310,328**	**252,415**

TABLE 35. TB funding support (US$) by entity during 2019 (2018-2020)

TB Funding 2018-2020	Domestic				Donor							
	PC-1 Pjb	PC-1 KP	PC-1 Sindh	Total	GF				TB REACH			
					NTP	MC	IHN	Total	MC	Bridge	Dopasi	Total
	1,552,716	160,924	1,133,950	2,847,590	27,832,296	5,182,899	14,527,155	47,542,351	58,485	120,162	252,415	431,062

During the year 2019 (2018-2020), the available support for TB control activities in Pakistan mainly came from the Global Fund (93%) followed by a meagre bunch of resources from provincial public sector (6%) and about 1% from the TB REACH project.

FIGURE 33. TB Funding support (US$) by entity during 2019 (2018-2020)



The status of expenditures against the available support from the GF and variance is reflected in the table given below. The average burn rate remained at 57% which is quite low.

TABLE 36. Available GF budget v/s expenditure at NTP Pakistan during 2019

S. #	Description	Budget	Actual	Variance
1	Human Resource (HR)	6,867,082	3,891,974	2,975,108
2	Travel related cost (TRC)	2,113,835	1,188,234	925,601
3	External Professional Services (EPS)	67,148	134,233	-67,085
4	Health Products (Pharma) HPPP	12,827,658	5,207,124	7,620,534
5	Health Products (non Pharma) HPNP	1,247,294	559,123	688,171
6	Health Products Equipment (HPE)	3,352,052	4,545,053	-1,193,001
7	PSCM	2,403,266	1,109,436	1,293,830
8	Infrastructure (INF)	0	27,861	-27,861
9	Non-Health Equipment (NHP)	19,499	24,695	-5,196
10	Comm Material & Publications (CMP)	48,426	48,682	-256
11	Program Administration Cost (PA)	437,238	264,003	173,235
12	Living support to client/target pop (LSCTP)	1,018,238	372,553	645,685
	Total	**30,401,736**	**17,372,971**	**13,028,765**

TABLE 37. Progress update GF grant v/s PF indicators (year 2019)

Indicator	Target	Result	%
TCP-1(M): Number of notified cases of all forms of TB-(i.e. bacteriologically confirmed + clinically diagnosed), includes new and relapse cases	423,082	327,957	**78%**
TCP-2(M): Treatment success rate- all forms: Percentage of TB cases, all forms, bacteriologically confirmed plus clinically diagnosed, successfully treated (cured plus treatment completed) among all TB cases registered for treatment during a specified period, new and relapse cases	91%	92%	**101%**
TCP-3: Percentage of laboratories showing adequate performance in external quality assurance for smear microscopy among the total number of laboratories that undertake smear microscopy during the reporting period	85%	97%	**114%**
TCP-4: Percentage of reporting units reporting no stock-outs of anti-TB drugs on the last day of the quarter	100%	97%	**97%**
TCP-7a: Number of notified TB cases (all forms) contributed by non-national TB program providers – private/non-governmental facilities	139,532	117,919	**85%**
TCP-7b: Number of notified TB cases (all forms) contributed by non-national TB program providers – public sector	4,315	3,596	**83%**
MDR TB-2(M): Number of TB cases with RR-TB and/or MDR-TB notified	4,500	2,472	**55%**
MDR TB-3(M): Number of cases with RR-TB and/or MDR-TB that began second-line treatment	4,500	2,998	**67%**
MDR TB-5: Percentage of DST laboratories showing adequate performance on External Quality Assurance	86%	83%	**97%**
MDR TB-6: Percentage of TB patients with DST result for at least Rifampicin among the total number of notified (new and retreatment) cases in the same year	13%	26%	**200%**
TB/HIV-5: Percentage of registered new and relapse TB patients with documented HIV status	10%	40%	**400%**

4.4.1. Office of Inspector General (OIG) Visit to Pakistan (5th Dec 2019):

The Global Fund has invested US$697 million in Pakistan since 2003. Office of the Inspector General (OIG) at Global Fund safeguards the assets, investments, reputation and sustainability of the Global Fund by ensuring that it takes the right action to end the epidemics of AIDS, tuberculosis and malaria. Through audits, investigations and advisory work, it promotes good practice, reduces risk and reports fully and transparently on abuse. OIG conducted an audit of TB, AIDS and Malaria Grants in fall 2019. It focused on following areas of the grant implementation:

- the effectiveness of the implementation of Global Fund programs with a focus on the impact of the devolution and government commitment to the three diseases (sustainability)

- the efficiency of the supply chain management and financial management systems (optimization); and
- the design and the effectiveness of internal controls in safeguarding Global Fund resources (Program Management, Financial Management, PSM and SR Management)

OIG has published its report in April 2020, and can be ascertained from GF's website. It is pertinent to mention here that no major finding was observed during the audit of NTP. The OIG and the Secretariat have agreed a set of actions and related deliverables to address the findings. Specifically, the Global Fund Secretariat and in-country stakeholders will work to Increase access to TB services in rural areas. It was also recommended to decentralize access to HIV services and effective implementation of confidentiality policies, undertake cost-effectiveness analysis of TB interventions across the portfolio to determine activities to be scaled up for maximum yield, devolve the implementation arrangement to at least one province and to review and update the existing financial risk mitigation measures on the portfolio

4.4.2. New Funding Model (NFM-2) Grant (2018-2020):

The Global Fund developed and implemented a new funding model to enhance the Global Fund's ability to support strategically focused programs that have a greater and more sustainable impact in the fight against AIDS, Tuberculosis (TB) and Malaria.
It is designed to help the Global Fund invest resources more strategically, draw on partnerships to increase quality of the programs it supports and incorporate lessons learned from the previous rounds-based system of funding.

The new model represents a shift in the way the Global Fund works and changes the way implementers access funding, turn funding requests into implementation-ready grants and then manage these grants.

The current grant was approved with total budget of USD 144,163,205 for the period January 2018 to December 2020. However, an additional funding of USD 2. 2 million was approved for private sector PRs under Fund Portfolio Optimization.

TABLE 38. Additional funding under fund portfolio optimization (PO) BY PRs

Principal Recipient	**Sub Recipients**	**NFM-2**	**PO**	**USD** (million)
National TB Control Program	▪ PTP Balochistan ▪ PTP KP ▪ PTP Punjab ▪ PTP Sindh ▪ ACD ▪ ASD	89.2	-	89.2*
Indus Health Network		40.0	1.18	41.18
Mercy Corps	▪ ACD ▪ ASD	15.0	1.02	16.02
TOTAL		**144.2**	**2.2**	**146.2**

4.4.3. Pakistan Allocation for 2021 – 2023:

Based on the Global Fund Board's decision in November 2019 on the funding available for the 2020-2022 allocation period, Pakistan has been allocated USD 171,981,709 for Tuberculosis. The allocation amount has been determined according to a methodology approved by the Global Fund Board, primarily based on disease burden and income level. NTP has started its process to submit the funding request within stipulated time to ensure its timely approval from The Global Fund.

4.4.4. Challenges & lessons learned

- Coordination between PR and public sector SRs in the post devolution scenario remains an issue to be settled.
- The NSP remained largely unfunded due to disparity between donor and domestic funding (<10%).
- Delayed reporting to Global Fund due to delayed submission of PUDRs by public sector SRs
- No HR (field staff) available at federally managed four regions (AJK, GB, FATA & ICT)
- Engagement of NGOs and parastatals remained a challenge
- Limited community-based TB activities were conducted
- Securing Tax exemption by SRs still remains a major challenge
- Lack of sustainable partnership activities in the long run with no exit strategy in place after withdrawal of GF support

4.5. Internal Audit Unit:

CMU has a central Internal Audit Unit – IA, whose independence is ensured through its direct reporting to the highest level in the organization i.e. the National Coordinator - NC. The primary objective of IA is to provide independent assurance that the Program's risk management, governance and internal control processes are operating effectively. IA has been charged with the responsibility of ensuring that all the entities [PR/SRs/SSRs] involved in GF project are subject to Risk Assessments and Post Audits periodically, preferably on an annual basis. IA activities may be categorized as under:

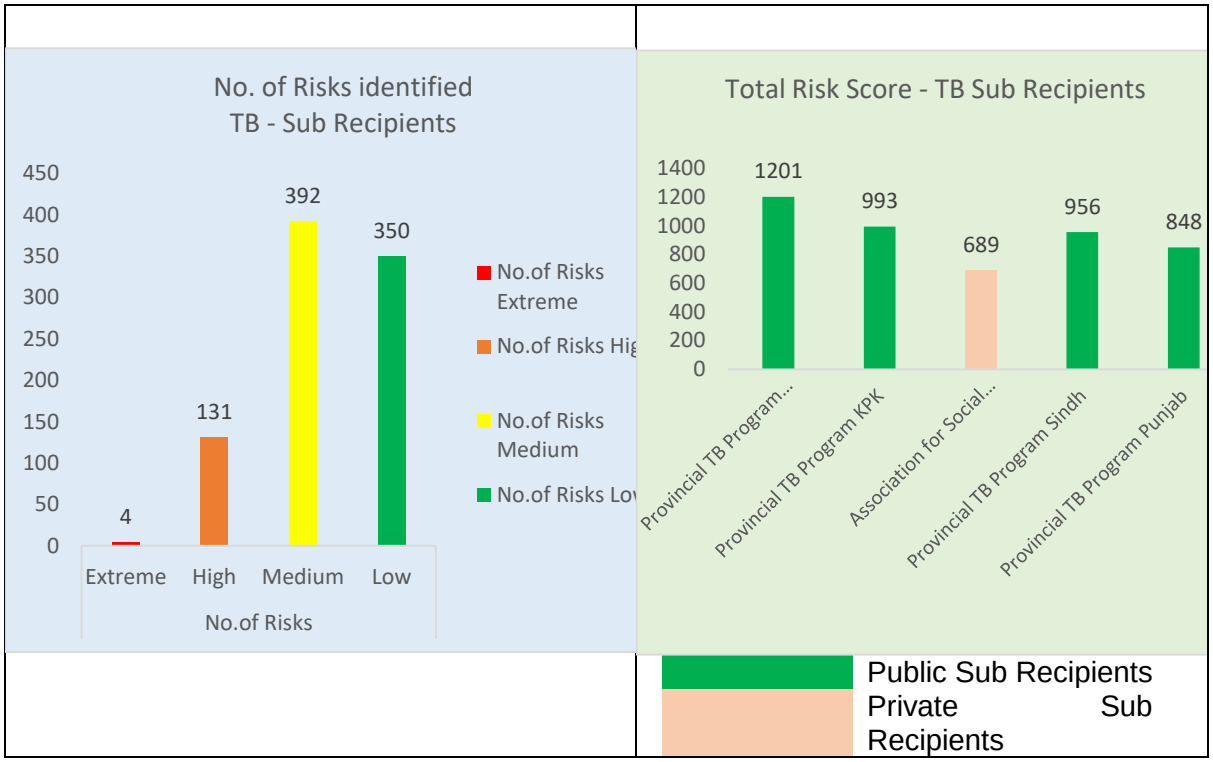
a) Risk Assessments and Risk Register Maintenance across all the SRs
b) Post Audits of all the Project Entities as per Audit Plan
c) Consulting services to CMU departments / Project entities
d) Inquiries & Investigations
e) Pre-audit of transactions above specified thresholds

4.5.1. Risk Assessments

The IA unit took the first step towards creating a risk conscious culture within the CMU as well as the Sub Recipients. CMU Internal Audit Unit prepared Risk Registers relating to different program processes of Common Management Unit (Principal Recipient) as well as all Sub

Recipients of TB. The objective of this assignment was to facilitate/assist the management in identifying various risks applicable to TB program processes and for taking appropriate mitigating actions. The IA role was limited to the extent of facilitating the management in identification of such risks. These risks were Rated in Extreme, High, Medium and Low categories by looking at the likelihood and impact of each Risk on program objectives.

During the year 2019, the IA unit developed and updated Risk Registers for all NTP-SRs. Following graphs highlight the Total Risks identified in various categories along with Total Risk Score:



4.5.2. Post Audits

The results of Risk Assessments serve as a guiding tool for IA to develop an annual Audit plan in which priority is given to High Risk Areas / Entities in terms of their audit timing and frequency. The scope of audit is not limited to the review of financial processes alone but also covers the review of key Support processes i.e. stocks management function [diagnosis, treatment, prevention & other items], Procurement management, Assets Management, HR & Admin etc. At the conclusion of each audit, audit report is presented to NC identifying areas of control weaknesses and instances of non-compliances with applicable laws & policies along with recommended courses of action to address these issues. The overall result is an attempt to strengthen control processes of auditees in order to ensure that project interventions and targets are achieved, as per approved work plan, effectively and efficiently. Post audit is further supported through pre audit of transactions of a defined magnitude, at CMU and PTPs.

During the year 2019, IA unit successfully completed audits of all the NTP SRs identifying key issues and recommended courses of actions to address them. In addition, Post Audit of following CMU functions were also conducted that encompass activities of CMU including those targeted towards TB related operations:

- Asset Management

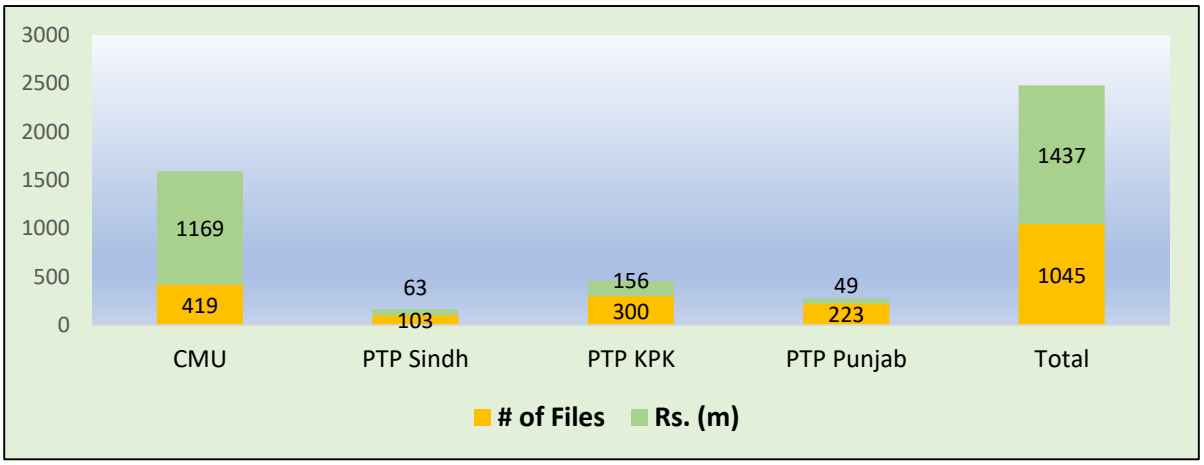
- Human Resource Management
- Procurement Management Function
- General Administration

Moreover, a detailed database of past Audit recommendations was prepared for follow up.

4.5.3. Pre-Audits:

During the year 2019, over 1,045 cases were sent to IA unit for pre-audit. Total value of such cases reviewed amounted to Rs. 1,437 million at PR / SR levels. Following graph depicts the status of pre audits cases:

FIGURE 34. Summary of the Pre-Audits during 2019



4.5.4. Inquiries, Investigations and Consulting services:

In addition to Risk Assessments and Auditing services, IA engages from time to time, in inquiries and investigations that are referred to IA by National Coordinator. Each such inquiry / investigation is accompanied by a detailed report highlighting the background facts and recommendations.

IA also offers consultative services to management as and when requested, by providing valuable inputs to the subject matter. Various special assignments were carried out during the year 2019 including joint reviews with LFA. The special assignments include inspections, physical verifications, interpretation of applicable laws and regulations, contract and tender management reviews and any other service requested.

Currently, IA has also been assigned to serve as a focal point for whistle blowing. Draft policy has been developed awaiting approval by the competent authority. In addition, IA plans to acquire a tailored software solution for audit and risk management, which will automate IA procedures and improve overall departmental performance.