## ANNUAL REPORT 2016





National TB Control Program Government of Pakistan

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National TB Control Program Ministry of National Health Services Regulations & Coordination Islamabad-Pakistan



National TB Control Program Government of Pakistan

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## Acronyms

ACD	Association for Community Development
ACSIVI	Advocacy, Communication and Social
	NODILIZATION
AIDS	Acquired immunodenciency Syndrome
	Azad Jammu and Kashmir
AKHSP	Aga Khan Health Services Pakistan
AKI	Antiretroviral therapy
ASD	Association for Social Development
BA/BE	Bioavailability and bioequivalence
BCC	Benavior Change Communication
BDN	Basic Development Needs
BSL	Biosafety Level
CBOS	Community-Based Organizations
CCM	Country Coordinating Mechanism
CNIC	Computerized National Identity Card.
CNR	Case notification rate per 100K population
CPT	Co-trimoxazole preventive therapy
CXR	Chest X-ray
DHO	District Health Office
DLS	District Laboratory Supervisor
DMU	Drug Management Unit
DOTS	Directly Observed Therapy short Course
DSM	Direct smear microscopy
DST	Drug susceptibility testing
DTC	District TB Coordinator
DUHS	Dow University of Health Sciences
ED(H)O	Executive District (Health) Office
EMR	Eastern Mediterranean Regional Office of WHO
ENRS	Electronic nominal registration system,
EQA	External Quality Assurance
FATA	Federally Administered Tribal Areas
FEFO	First Expired First Out
FLD	First-line anti-TB drugs
GB	Gilgit-Baltistan, formerly Northern Areas
GDH	Gulab Devi Chest Hospital
GF	Global Fund
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GIS	Geographic Information Systems
GMMCH	I Ghulam Muhammad Mahar Medical College
	Hospital Sukkur
GP	General Practitioner
GS	Green Star
HCW	Health care workers
HDL	Hospital DOTS Linkage
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
OICD	Ohja Institute of Chest Diseases, Karachi
ICT	Islamabad Capital Territory, formerly Federal CT
	(FCT)
IHK	Indus Hospital Karachi
IRD	Interactive Research and Development
IUATLD	International Union Against TB and Lung Diseases

КРК	Khyber Pakhtunkhwa
LED	Light emitting diode technology
LHW	Lady Health Worker
LPA	Line probe assay
M&E	Monitoring and Evaluation
MALC	Marie Adelaide Leprosy Centre, Karachi
MC	Mercy Corps International
MDGs	Millennium Development Goals
MDRTB	Multidrug-resistant TB
MOH	Ministry of Health
MoNHS	R&C Ministry of National Health services Regulations
	& Coordination
NACP	National AIDS Control Programme
NAs	Northern Areas
NFM	New Funding Model of the Global Fund
NRL	National Reference Laboratory
NSP	National Strategic Plan
NTP	National TB Control Program
OPD	Outpatients Department
PACP	Provincial AIDS Control Programme
PATA	Pakistan Anti-TB Association
PC-1	Planning Commission Form 1
PHC	Primary Health Care
PIMS	Pakistan Institute of Medical Sciences
PIU	Programme Implementation Unit of the Global Fund
PLWHIV	People living with HIV
PMDT	Programmatic Management of Drug-resistant TB
PPE	Personal Protective Equipment
PPHI	People's Primary Health Care Initiative
PPM	Public-Private Mix
PPP	Public-Private Partnership
PQ	WHO prequalification
PR	Principal Recipient
PTP	Provincial TB Control Programme
PTP	Provincial TB Control Program
PV	Pharmacovigilance
RR-TB	Rifampicin-resistant TB
SLD	Second-line anti-TB drugs
SSF	Single-Stream Funding of Global Fund
STP	Stop TB Partnership (Pakistan)
ТВ	Tuberculosis
TB-DMIS	TB Drug Management Information System
ТСН	Tertiary care hospital
IGF	The Global Fund
TOT	Training of trainers
TRP	Technical Review Panel of the Global Fund
UN	United Nations
UVGI	Ultraviolet Germicidal Irradiation
WHO	World Health Organization
WIMS	warehouse Management System
XDR	Extensively drug-resistant IB





Message of National Program Manager

## We Pledge Zero TB Deaths till 2020

Tuberculosis remains a major public health problem in Pakistan, ranking fifth among 30 high burden countries globally for both drug sensitive and drug resistant TB. Amongst more than 500,000 incident cases, annually, about one third are still missed to be diagnosed and notified. TB affects the most productive years of life with high catastrophic cost to TB families and impacting the socio-development indices in the country. The national and provincial governments, with the allied partners are pledged to provide quality assured free diagnostic and treatment services across the country both for drug sensitive and drug resistant TB in Pakistan.

The post-2015 era signifies the historic transition from Stop TB Strategy to The End TB Strategy for TB control as well as from the Millennium Development Goals to the post-2015 development agenda with its Sustainable Development Goals (SDGs).

Post-2015 Global plan to end TB offers an innovative approach towards ending the TB epidemic and achieving the 90-90-90-90 targets for TB. It focusses on key affected populations, the most vulnerable and high risk groups, involving communities for multisectoral partnerships and positions the private sector as an integral partner.

We are doing continuous efforts to scale up proven interventions, implement innovative approaches and accelerate research and development to move towards ending the TB epidemic in Pakistan with enhanced domestic and donor support. We aim for a TB free Pakistan, reduction in TB deaths and TB sufferings and sharing the global vision of a world free of TB.

Dr Nasir Mahmood Khan National Manager National TB Control Program, Pakistan



## **EXECUTIVE SUMMARY**

Pakistan is home to 185 million1people, making sixth most populous country in the world. Approximately 35% of the population is less than 15 years of age. More than 60% of the total population lives in rural areas. Pakistan is lower Middle income country. The annual health expenditure per capita is estimated at US \$ 39.43.

Tuberculosis (TB) continues to be a major public health challenge in Pakistan. Tuberculosis was declared as national emergency in 2001 and WHO recommended DOTS strategy was adopted

**TB DISEASE BURDEN**: Pakistan ranks 5th among **the 30** high TB burden countries. It accounts for approximately 2/3rd of the TB burden of the Eastern Mediterranean Region (EMR) of the World Health Organization (WHO). TB disease burden estimate is based on nationwide population-based **TB prevalence survey** carried out in 2010/2011, estimated TB prevalence rate (all forms and all ages) was 342 cases in 100,000 population (95% CI: 284- 406) and TB incidence rate was 275 TB cases per 100.000 populations. (95% CI: 205-357).According to W.H.O estimates, mortality rate of TB was 26 deaths per 100,000 populations in 2015(Global TB Report 2016). **DRTB estimates** are based on the t **National drug resistance survey**, conducted in 2012/13. Estimated proportion of MDR and RR in new TB cases is 3.7% and 4.2% respectively. Proportion of MDR in retreatment cases is 18.1% but subsequently estimate were revised to 16% RR in retreatment cases based on surveillance data.

TB case Finding and treatment coverage: In 2016 all type TB cases notified was 356,390 compared to 323856 in 2015. With this treatment coverage increased to 69% compared to 63% in 2015.

An increase in case notification seen in 2016 is attributed to the scale up of private sector engagement in TB control. In 2016 a total of 100803 were notified compared to 71899. Among TB cases notified by the private sector 54% of the cases were notified by the Intervention focused around engaging General practitioners and private laboratories.

An increase in TB case notification was seen both in Children (11% to 12%) and TB cases with extra pulmonary lesion but a decline was seen in proportion of bacteriologically confirmed TB cases (41% to 39%).

Treatment success rate was maintained at high level both for new (91%) and retreatment TB cases (83%).

Drug resistant TB: In year 2016, a total of 3331 DRTB cases were detected and 2881 were enrolled on treatment. New drugs including Bedaquilline and Delamanid were introduced for treatment of selected patients.

Treatment outcome of cohort of patient enrolled on second line treatment in 2014 showed success rate of 65 % which was lower than treatment success rate reported for cohort of patient enrolled in 2013. A high lost to follow up and mortality rate was main reason for low success rate.

<u>TB diagnosis and laboratory network</u>: Microscopy mostly remained as front line test. With expansion of private sector, TB diagnostic center offering microscopy services were increased to more than 1700 center. About One million presumptive Tb cases were tested using microscopy centers.

Xpert testing facilities were made available at 73 sites by NTP and additional Xpert sites were operated by the Indus hospital. A total of 127,791 were tested using Xpert and 35,984 were reported as TB cases and 3331 were reported as rifampicin resistant TB cases. Funding was secured for scale up xpert through reprogramming of NFM.

Twelve culture laboratories including three DST laboratories providing services for PMDT .LPA was introduced in three laboratories.

DST services offered by public sector is gradually increasing and in year 2016 a total of 3115 DST were reported by three public sector laboratories (NRL, PRL-Sindh, PRL-KP) and 599 by TIH laboratory.

**Operational research**: Structured Operational Research and Training Initiative course (SORT IT) was successfully conducted in 2016 facilitated by international and national facilitator.

Four research studies are ongoing including 1) National inventory study to measure TB under-reporting in children in 12 selected districts in Pakistan. Ii) GIS based Innovative strategies to enhance yield from contact tracing among drug resistant TB in Rawalpindi and Islamabad iii) 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 .Iv) Knowledge, Attitude and Practices (KAP) regarding household infection control practices among MDR/XDR TB patients, in Pakistan.

In 2016, three articles were published in international peer reviewed Journal.

National TB Control Program designed a comprehensive communication strategy for 2016 for creating awareness to general public regarding TB diagnosis, care and treatment. Multiple interventions were planned for creating awareness by using different tools like media, interpersonal communication to deliver the TB message to the targeted population. World TB day was celebrated at the national and provincial level, walks were arranged, and road shows through mobile theatres were also conducted. TV and Radio advertisements were on-aired all year long and special supplements and newspapers insertions were designed and placed in all major newspapers across the country on the occasion of World TB day.



## NATIONAL TB CONTROL PROGRAM

MISSION:	"A TB Free Pakistan"
VISION:	"Universal Access to TB Care achieving Zero TB Death"
GOAL:	"To reduce the prevalence of TB by 50 % by 2025"

#### A. Historical Background and TB epidemiology

Pakistan is the world's sixth most populous country with an estimated population of 189 M. Total life expectancy at birth is 66.4yrs and approximately 35% of the population is under 15 years of age<sup>1</sup>. More than 60% of the total population lives in rural areas<sup>1</sup>. Pakistan in low middle income country with nominal <u>GDP per capita</u> of \$1,428<sup>1</sup>



TB is one of the major public health problems and Pakistan ranks 5<sup>th</sup> among 30 high-burden countries for TB and 6<sup>th</sup> for DRTB. Disease burden is based on nationwide prevalence survey (2010-11) and Drug resistance survey (2012-13). Estimated TB incidence and prevalence is respectively 270 and 342/100K with an estimated 510,000 new TB cases each year. TB mortality is showing decline and currently is at 23 deaths per 100K population (2015).<sup>3</sup> The WHO recommended DOTS strategy was piloted and adopted in Pakistan in 1995. Major progress in TB control, however, was only achieved after the revival of the NTP in 2001 when TB was declared a national public health emergency through the "Islamabad Declaration". (10) Although steady progress has been made from 2001 to improve case detection and treatment success rates, TB continues to be a major public health problem.

<sup>1.</sup> http://data.worldbank.org/data-catalog/world-development-indicators

<sup>2.</sup> Global TB Report 2016 , World health organization

<sup>3.</sup> Qadeer E, Fatima R, Yaqoob A, et al. Population based national tuberculosis prevalence survey among adults (>15 years) in Pakistan, 2010-2011. PLoS One. 2016; 11(2):2010-2011. doi:10.1371/journal.pone.0148293

<sup>4.</sup> S Tahseen, E Qadeer E, F M Khanzada, AH Rizvi, A Dean, A vanDeun, M Zignol. Use of Xpert(\*) MTB/RIF assay in the first national antituberculosis drug resistance survey in Pakistan. Int J Tuberc Lung Dis 2016Apr; 20(4): 448–55.



Population(M)	189 M
Avg Density population /Km2	245.1sqKm
Rural: Urban Population	68:32
Number of districts	145
Incidence Rate	270/100,000
Estimated Incident TB cases	510,000 (330,000–729,000)
Estimated incident RR/MDR cases	14 000(11 000–16 000)
% of TB cases with MDR/RR-TB	New cases: 4.2%
	Previously treated: 16%
TB/ HIV	<ul> <li>TB cases screened for HIV = 3.5%</li> <li>HIV+ among screened TB cases ≤1%</li> </ul>



Figure 1 : Pakistan estimated Incidence and Mortality rates (WHO Global TB report 2016)

The NTP functions under MoNHSRC and is responsible for overall coordination, policy direction and technical guidance for TB control, while implementation is the responsibility of the Provincial TB Programmes (PTPs) and district health authorities. (11) Government commitment, coupled with technical leadership resulted in the development of three multi-year strategic plans in the past 15 years.

Ending the TB epidemic is part of the UN's new global agenda embodied in 17 SDGs and adopted on 25 September 2015 by the 193 member states. Goal 3.3 of the SDGs aims to end the epidemics of HIV, TB, malaria, and neglected tropical diseases and combat hepatitis, waterborne diseases and other communicable diseases by 2030. (6)



### B. Organization of TB control activities in the country

NTP has the stewardship role in TB control efforts in the country. The figure below reflects the organization of TB control activities in the country.



#### C. NTP Key organizational unit and functions

Key organizational units, key functions and name of unit head/key person responsible in 2016 is listed in table 1. In view of devolution, organizational structure of NTP was under restructuring which was full implemented in year 2017



Table 1: List of Technical	/administrative	units of NTP in 2016
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	Organizational Unit	UNIT Head /Key	Key Functions		
1	Technical/ Monitoring and surveillance	Dr Basharat Javed/ Dr Khawaja Laeeq wef August 2016	Coordination Core DOTS- surveillance monitoring/ Guideline development		
2	GF Project Implementation Unit	Dr Mohammed Ayub up-to July 2016	Oversight of GF intervention		
2.1	Public Private MIX (PPM)	DR Hussain Hadi	Coordination with stake holders and surveillance of PPM interventions		
2.2	TB and HIV	Dr Amir safdar	Coordination with stake holders and surveillance of TB and HIV activities		
2.3	Pediatrics TB and HDL	Dr Ali Mirza	Coordination with stake holders and surveillance of CHTB intervention		
2.4	Infrastructure Up- gradation	Dr Mohammed Amjad	Coordination and oversight of BSLII/III labs and PMDT sites upgradation process		
2.5	Infection control	Dr Yasir Waheed	Oversight/surveillance of IC activities at PMDT sites		
2.6	Health system strengthening	Dr Fakhra Naheed	Coordination and oversight of HRD implementation plan		
2.7	ACSM	Ammara Omer	Coordination and oversight of ACSM interventions		
3	MDR	Dr Zafar Toor/Dr Raja	Coordination with stake holders and surveillance of PMDT activities		
4	National Reference laboratory	Dr Sabira Tahseen	Provision of diagnostic services and surveillance of drug resistance		
5	Drug management	Mr Nadee Mir /Mr Naveed Chaudhry wef July'16	Forecast/procurement/distribution of drugs		
6	Operational Research	Dr Razia Fatima	Implementation of OR plans		
	ADMINISTRATIVE/SUPPORT UNIITS				
1	Principal Recipient Unit	ecipient Dr Abdul Ghauri			
2	Finance Unit	Mr Khalid Rizwan /Mr Mohammed Zaheer wef August 2016			
3	Procurement supply Management (PSM)	Mr Nadeem Mir			



## I. POLICY AND STRATEGIC DIRECTION

### A. CORE DOTS

#### 1. ENGAGING ALL HEALTH CARE PROVIDERS (Public Private Mix)

Public-Private Mix (PPM) for TB care and control is a crucial component of efforts to meet WHO and Stop TB Partnership targets for global TB control. In Pakistan, PPM interventions have achieved some promising initial results, but there is a critical need to enhance the degree of collaboration among those currently engaged and reach out to a greater number and range of providers

There are four basic models implemented in the country; the GP model, NGO's Model, Pvt Hospital model & Parastatal model. After very encouraging results of retail pharmacies in five piloted districts this was also expanded and 2000 pharmacies with high burden cities were mapped and engaged.

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.

Program Achievements 2016:

The program activities under NFM grant continued during 2016. The PPM is enhanced to almost 3380 GPs, 116 NGO's network, 34 Pvt. Hospitals & 31 Para statal hospitals 300 pediatricians in selected districts under GSM & 2000 Pharmacies in the country. GSM & PTPs worked as SR with NTP while other partners ASD, ACD, PLYC, BCF, MALC, SPO contributed as SR to Mercy Corps. The GP model extends its coverage to 88 districts of Pakistan harboring 80% of the population. Pakistan anti TB association, Green star & Indus hospital, Gulab Devi hospital remain the major contributors of other PPM Model.

Four TOT held in 2016 to impart further trainings across all provinces. 60 participants were trained in these TOTs. Community gatherings and engagement of Community Notables for better coordination and enhanced case detection

Among TB cases notified by private sector, 6% of cases were Cat-II TB cases. There mechanism place for appropriate referral of all presumptive cases of DR-TB has been defined and will be implanted with scale up of Xpert coverage.

Key Achievements

- PPM has contributed 27% all types cases to national data and more than 100,000 all types TB cases were notified through four models of PPM with a treatment success of over 91%.
- The GP model contributed maximum number of cases followed by NGO model.
- Chest camps strategy for outreach TB services for active case finding has been at a rise and 1038 chest camps were conducted in 2016 by GSM and contributing 1663 additional cases.
- District External Quality Assurance (EQA) covers private sector laboratories.
- · Monitoring ensured by the senior management of both PR and SR
- Piloting m-Health application in selected districts and to conduct operational research alongside to demonstrate its effectiveness and impact.
- World TB Day has been commemorated at all districts under PPM interventions with the support of Provincial programs and GF. The activities included press conferences, walks, and awareness sessions with high risk populations
- A MoU is signed with International Organization for Migrants (IOM) is a UN organization to make the TB services available to its clients.

• National Rural support Program signed a MoU with National TB control Program to engage their volunteers for TB control efforts in Pakistan

#### Challenges

- · Largely unregulated private sector which need legislation for regulation
- Tedious documentation in TB DOTs program needs simplified recording and reporting tools for private sector.
- High rate of drop out of labs and GPs, non-functional GPs

#### Way forward

- Legislation for mandatory notification of TB cases in Punjab and Balochistan. Development of implementation modalities of legislation.
- Implementation of active case finding approaches in outreach.
- 2. HOSPITAL DOTS LINKAGE INTERVENTION (HDL)

While the scale of the TB burden facing Pakistan is large and the response is desired to be commensurate. There is evidence that TB cases were being missed in large hospitals particularly in Tertiary Care Hospitals (TCHs) where TB services although available but do not cover the entire population seeking health care from these hospitals.

Traditionally large number of patient seek care from these hospitals and the lack of standardized TB DOTS services across all OPDS/Ward and presumptive TB cases /patients being scattered across various departments leads to TB cases being missed within health facilities. In these settings most of the presumptive TB often go unrecognized and in other instances diagnosed and treated the case may not be reported to NTP or the treatment may not follow national guidelines. The long duration of treatment also creates issues with treatment compliance as many patient have their residence at far distances from TCHs and referral system with periphery BMU is often weak and ineffective. Furthermore patients arriving at the TCH may present with concomitant TB which might be missed when treating the primary ailment. Hence, consolidation of DOTs services to cover all OPDS and wards has potential benefit to capture the "missing cases" and strengthening of linkages between TCH and PHC can be instrumental in improving treatment compliance.

#### HDL OBJECTIVES

- 1. To enhance and standardize TB case management in a tertiary care hospital (TCH)
- 2. Reduce missing/loss to follow up cases by improving referral mechanisms within the TCH
- 3. Reduce loss to follow up and default rate by referring patients to peripheral management facilities

It should be noted that the prerequisites of establishing the HDL intervention in a TCH setting automatically entails an element of capacity building. These prerequisites pertain to capability of TCH laboratory facilities, capacity to handle the logistics related to the intervention, commitment to providing HR and facilitating the intervention. Beyond this HDL implementation can be envisaged as incorporating the following components:

- i. Internal Network/Hospital Coordination Mechanism To identify and refer presumptive TB cases to the DOTS centre, and/or manage TB cases according the NTP's standardized guidelines; thus reducing "missed" cases.
- ii. External Network To refer patients to peripheral BMUs/BHUs; easing accessibility and reducing loss to follow up and default cases.
- iii. Reporting & Monitoring To monitor implementation and provide data for program improvement
- iv. Explore and build system linkages to enable improved function of NTP within the context of devolution, while contributing to Health System Strengthening

#### **Way Forward**

Over the course of 2016, the HDL intervention has expanded in both scale and scope; now featuring 48 TCHs and 140



District Headquarter Hospitals (DHQs) nationwide. Furthermore TCH being largest and best equipped health facilities in Pakistan's health system, Paediatricians were included in CHTB care. Furthermore some TCHs are also treatment site for Programmatic Management of Drug-resistant TB (PMDT) as well also host TB-HIV sentinel sites. In view of these, the HDL mechanism provides opportunity for coordinated/integrated TB control activities in the tertiary care setting.

The scale up in the districts has presented new operational challenges and newly developed implementation guidelines will address these challenges, Increased integration of NTP's co-located interventions in TCHs is also being sought utilizing the HDL provided platform.

The focus in the coming years will be to consolidate this expansion and ensure that the key objectives of reducing missing cases, mainstreaming NTP protocols and reducing loss to follow up in TCH settings are being met.

#### 3. <u>CHILDHOOD TB</u>

A considerable proportion of Pakistan's population is in the younger age brackets. The significant representation in the 0-14 year age groups (35%) constitutes an important demographic for the NTP's Childhood TB component.

With current global research indicating childhood estimates to be below actual numbers, expansion of the Childhood TB component to 140 districts of Pakistan through the District Headquarter Hospitals (DHQs) is an important step taken by the NTP.

#### Activities:

- Successful implementation of the Childhood TB component in 140 DHQs. In particular, the provision dedicated human resource (Field Officer/Social Mobilizer) at district level need to be considered.
- · IPT prophylaxis to be instituted as a preventive measure for Childhood TB component.
- · Mandatory contact screening of children of families living with TB.
- · Coordination with PPM component to bring the childhood intervention to private sector hospitals
- · Advocacy for linking TB activities with PHC/LHW program

**TRANSITION TO NEW PEDIATRIC FDC DOSING REGIMEN**: The need for childhood TB medicines is critical in as crushing of tablets for children may result in incorrect dosages. This raises question of efficacy of treatment and the subsequent threat of drug resistance. Furthermore, the previously used drug formulation in dispersible FDCs were also not in line with the recommended dosages for children.

Accordingly, the new FDC's have been developed to ensure proper dosing of childhood cases. The necessary steps to make the transition from previous regimens to the new are given below. It is important to note that the dosage parameters as given in WHO 2014 guidance document remains the same; the formulation of the associated FDCs have been changed.

Updating National TB Guidelines: Pakistan has already adopted the recommended WHO guidelines and as such will not need to go for reprint. An addendum sheet may be circulated with the new FDC combination dosages and the same mentioned in the trainings as was done earlier

#### ACHIEVEMENTS;

- The CHTB intervention has now been scaled up across the country to all district headquarters hospitals (141 *District Headquarter Hospitals*) while HDL has expanded to include a further 16 tertiary care hospitals (48 *TCHs*).
- · In light of global shortage of PPD and consequent upon the discussion and recommendations of the STAG to



revise PPA scoring chart with the support of Pakistan Pediatric Association a special two-day workshop was held in Islamabad on 1<sup>st</sup> & 2<sup>nd</sup> of December 2016. The workshop was attended by leading professor of PPA from all segments of Pakistan Pediatric Association, they revised the PPA scoring chart and endorsed for a situation where PPD is not available. The meeting of the sub-group of Childhood TB was held on 2<sup>nd</sup> December 2016, in Islamabad. Childhood TB management guidelines and training modules were updated and revised accordingly.

- A National CH-TB TOT was held in Islamabad in December 2016 and fifteen participants were trained as master trainer. The following eligibility criteria is suggested for developing subsequent pool of Master trainer ,which includes i) Pediatrician, a chest specialist and PTP Staff engaged in management of childhood TB ii)Trained in Basic DOTS and iii) having good communication skills
- New revised childhood TB regimen was introduced in Pakistan in 2016 and roll out started in 2017.

#### 4. TB-HIV COINFECTION

**A. Background:** In Pakistan, the trend of HIV epidemic has shifted from a low prevalence state to concentrated epidemic among the key populations at risk which is mainly driven by people who inject drug and sex workers. HIV prevalence is 27% among PWID and 5% among other high risk compared to estimated prevalence of HIV among the general population of less than 0.1%.

**B. Progress and Achievements:** The project has been implemented in four provinces of Pakistan in order to control TB/HIV co-infection. 17 Sentinel sites in 4 provinces were selected and strengthened, through collaborative efforts of disease control programs for screening, care and support of TB-HIV co-infected patients.

The existing TB/HIV collaborative activities are being revamped and strengthened. A key feature of this scale up is the activiation of the Provincial TB/HIV Coordination Committees and ensuring regular Provincial coordination committee meetings at provincial level.

Achievement in 2016 : TB/HIV Co-infection activities continued at 17 Sentinel sites across Pakistan, 13092 compared to 12238 tested in 2015 and 71 were reported positive in 2016 e against 59 in 2015.

#### Way Forward/ Future Plans:

- i. Sustained political commitment and active involvement of all relevant stake holders to ensure the sustainability of the intervention.
- ii. 23 more Sentinel sites will be established in 2017.
- iii. Review / revision of the training modules for the health care provider (Managers, doctors and paramedics)

To revise /adopt reporting and recording tools according to WHO recommendation and incorporate the changes in training modules under revision.

#### B. DRUG RESISTANCE TB:

**Background:** Based on estimated proportion of drug resistant TB cases of 3.7% MDR and 4.2% Rifampicin resistant (RR) in New TB cases and proportion of DRTB in retreatment cases of 16%, there were estimated 14000 DRTB cases among notified TB cases in 2016.

Achievement: Detection and treatment of DRTB remained a priority agenda.

- · 2881 patient were enrolled on second line treatment
- New drugs (Bedaquilline and Delamanid) introduced at four PMDT sites
- · Social support and transport cost given to DRTB patient enrolled on treatment are given



#### **Challenges:**

- In year 2016, 85% of DRTB cases detected were enrolled on treatment with gap of more than 400 patients between detection and enrolment.
- Number of PMDT treatment sites has increased from 3 in 2010 to 29 in 2016 but access is still limited as patient referred from 145 districts need to travel long distance to reach these treatment sites.
- High Fluoroquinolones resistance in the enrolled DRTB patients.
- Low geographical coverage and sub optimal use of GeneXpert testing.
- Un-regulated over-the-counter sale of unknown quality SLD.
- Currently patient based DRTB data is managed in excel file. Piloting of Electronic database is in process and will be implemented at all PMDT treatment sites
- Lack of bio availability/bio equivalence laboratory testing facilities of internationally standard in the country
- · Suboptimal linkages between BMU and PMDT treatment sites
- Involvement of private sector in referral and management of MDR-TB cases.

#### Way Forward:

- Scale up of GeneXpert and Improve geographical coverage of Gene Xpert sites (see NRL section for details)
- Implementation of universal DST referral.
- Plan to expand PMDT Treatment Sites to 36 units by the December of 2017.
- Piloting short course MDR TB regimen
- · Scale up access to New drugs (Bedaquiline and Delamanid) in 2017
- Strengthening Linkages of BMUs with PMDT sites for follow-up
- Involvement of PPM, other Govt. hospitals for referral of DR-TB suspects
- Proactive collaboration with Professional organizations (PCS, PATA, ICS, etc)

## B. Infection Control in Hospitals / Laboratories

**Background and objective (intervention):-** TB infection control is a combination of measures aimed at minimizing the risk of TB transmission within populations. The foundation of such infection control is early and rapid diagnosis, and proper management of TB patients. With scale up of DRTB care, adequate steps have been taken to ensure infection control at newly established PMDT sites and culture and DST laboratories.

#### Achievements

#### A. Up-gradation of PMDT

(Programmatic Management of DR-TB) Sites

- 30 hospital PMDT sites have been upgraded for Dr TB cases management.
- Conduction of TB Infection Control workshops at PMDT sites for:
- Health care workers awareness
- Distribution of TB IC Informative print materials
- Nomination of IC committee



- Health care workers surveillance
- General Hospital waste management

#### B. Development of Bio safety Laboratory Network

• Nationwide TB laboratory network development for diagnostic back-up services to enhance & ensure sufficient laboratory capacity to manage DR-TB cases.

- Establishment of TB culture & drug susceptibility testing centers
- Renovation of 19 Biosafety Level labs
- 14 BSL-2 (TB Culture labs) have been up-graded
- 5 BSL-3 (TB-Drug Sensitivity Testing) have been up-graded
- Provision of human resource
- Provision of lab equipment & reagents

<u>Constraints</u>: Inability of hospital stakeholder to timely vacate the proposed space for commencement of up gradation process, Inability of contractors to complete the up-gradation process due to multiple reasons.

#### Way forward:

- 1. Monitor implementation of Infection control practices at health care facilities to observe the progress identify & rectify issues & challenges.
- 2. To expand TB infection control initiative to congregate settings (prisons) emphasizing the need to reduce disease transmission within those communities.
- 3. Health care workers surveillance.
- 4. General Hospital waste management.
- 5. To conduct operational research in order to assess the extent of implementation and reasons associated with non-adherence to TB infection control practices.



## I. PROGRESS UPDATE AND PERFORMANCE INDICATORS

## A. CORE DOTS

#### TB CARE SERVICES IN PAKISTAN:

Coverage of Health care facilities offering TB services improved to some extent in public sector but significant improvement in coverage was seen as result of PPM initiatives. The PPM was enhanced to almost 3380 GPs, 116 NGO's network, 34 Pvt Hospitals & 31 Para statal hospitals 300 pediatricians in selected districts under GSM & 2000 Pharmacies in the country (see Table 2).

PUBLIC SECTOR		Primary (RHC)	Secondary (DHQ & THQ)	Tertiary	TOTAL	
	2015	619	431	36		1086
	2016	662	397	42		1101
PRIVATE SECTOR		GP Clinics	LABS	NGO	Pvt Hosp	Other Public Sector
		P	PPM-1		PPM-3	PPM-4
	2015	1991		105	27 57	
	2016	3380	433	116	34	31
TB HIV	2015			16		
Sites	2016		19			
PMDT		Р	Public		Private	
Sites	2015		24		3	
	2016		28		3	

#### Table-2: Summary table of TB care facilities in Pakistan

#### TB case Notification:

An increase in case detection rate was seen from 63% in 2015 to 69% in 2016 with notification of 356,390 all form incident TB cases.



#### Figure-3: Trend TB case notification 2012-206; All form and Bacteriological confirmed

#### CASE NOTIFICATION RATES and proportion of B+ versus clinically diagnosed PTB and EPTB Cases :

An increase of all form TB was seen from 174 in 2015 to 188 in 2016. However only minimal increase in CNR of B+ cases from 72 to 73 was reported



	<b>-~</b> -(	CNR B+	ll Form	
163	171	167	174	188
68	69	70	72	73
<b>~</b>	<b>~</b>	<b>~</b>	<b>~</b>	<b></b>
2012	2013	2014	2015	2016

Figure 4 : Case notification trend all type TB cases versus bacteriologically confirmed TB cases

In 2016, although case notification increased significantly but proportion of B+ve cases decreased from 41% in 2015 to 39% in 2016.. An important factor leading to decrease in bacteriologically confirmed TB cases was corresponding increase in CHTB cases and EBTB case notification



Figure-5: Bacteriologically confirmed, clinically diagnosed and EPTB case notification trend

Extra pulmonary TB case notified were 20% of the total TB cases notified. Highest proportion of EPTB cases were notified in KP province, while lowest proportion was seen in Punjab



Figure 6: Proportion of PTB cases and EPTB cases notification

#### NOTIFICATION OF RETREATMENT TB CASES (INCLUDING RETREATMENT)

No increase in notification of retreatment cases was seen in 2016 which remained same as seen in 2015. However a serious concern with regard to retreatmnet cases notified in 2016 is that 35% of these cases were diagnosed on clinically without bacteriological confirmation. This change lead to below 60% testing for rifampicin resistance among this cohort of TB patients.



11 6% 6% 7% 5% 6% 00 4% 4% 5% 4% ŝ 3% 2% 1% B. AN PUNIAB NATIONAL 0% FATA SINDH <u>ر</u>د ( ୈ P)+ 49 2012 2013 2014 2015 2016

#### Figure 7: Notification of retreatment TB cases (Including Relapse) :

#### PROVINCIAL CASES NOTIFICATION: 2016:

Compared to national case notification rate of 188/100, Punjab reported higher CNR of 223/100K followed by 216 /100k in GB. Other provinces reported a lower CNR then national of 179/100K of KP, 155 /100k by Sindh, 107/100k by AJK and 102 /100K by Baluchistan. FATA with case notification of 94 is at lowest in country

PROVINCES	Population	Incident TB cases	CNR	Prev. Treated	Total
AJK	5,288,087	5663	107	168	5831
Balochistan	9,916,595	10137	102	325	10462
FATA	4,381,707	4126	94	253	4379
GB	1,279,246	2767	216	228	2995
КР	25,260,986	45159	179	298	45457
Punjab	97,908,093	218284	223	3455	221739
Sindh	43,933,653	67987	155	4843	72830
ICT	1,152,534	2267	197	101	2368
Pakistan	189,120,900	356390	188	9671	366061

Table 3: Sub national TB	3 case notification
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#### Case notification by gender

TB cases notified nationally in male and females are almost equal. In 2016 male TB cases notified were 3000 above the female notification. However similar trend in gender difference reported at provincial in previous years is also noted in 2016. Higher proportion of TB cases are notified in Baluchistan, KP, FATA and GB .A higher proportion TB is notified in male in Punjab and Sindh province. (Figure-8)







#### CHILDHOOD TB CASE NOTIFICATION:

In year 2016, a total 41758 cases of CHTB were notified, which constitute 12% of the total case notification. CHTB cases notification has gradually increase from 10% in 2013.

Proportion of CHTB among notified TB cases is highest in Gilgit Baltistan (39%) and lowest in Punjab province (Figure 9)



#### Figure 9 : CHTB case notification and CNR by provinces

#### TB CASE FINDING AND CASE NOTIFICATION IN HIV+CASES:

TB/HIV Co-infection activities continued at 17 Sentinel sites across Pakistan, although number of total TB patient's screened at the established 17 sentinel sites increased to **13092** compared to **12162** tested in 2015 and number of patient detected HIV positive on rapid diagnostic test increases from **59** in 2015 to 71 in 2016.

Table 4. The screening of the cases								
	2012	2013	2014	2015	2016			
TB case notified (n)	285396	298980	316577	331780	366061			
TB PTs SCREENED (n)	10423	8306	10715	12162	13092			
TB patient screened (%)	3.7%	2.8%	3.4%	3.7%	3.6%			
TB patient reported HIV + (n)	17	49	90	59	71			
TB Pts reported HIV+ (%)	0.16%	0.59%	0.84%	0.48%	0.54%			

#### Table 4: HIV screening of TB cases

#### TB CASE CONTRIBUTION BY PRIVATE SECTOR:

The program activities under NFM grant continued during 2016. GSM & PTPs worked as SR to NTP while other partners ASD, ACD, PLYC, BCF, MALC, SPO work with Mercy Corps as SRs. The GP model extends its coverage to 88 districts of Pakistan covering 80% of the population. The introduction of incentives for Health Care Providers, revised training methodology for the health care providers is worth mentioning. Four ToT held in 2016 to impart further trainings across all provinces. 60 participants were trained in these TOTs.

An increase in case notification seen in 2016 (Figure-1) is attributed to the scale up of private sector engagement in TB control (Figure-10).





Figure-10: Private sector contribution trend in TB case notification (New +previously treated)

In 2016, by far the most successful PPM model PPM is engagement of private practitioners which is contributing 53% of the total TB cases notified by private sector

The PPM has contributed 27% all types cases to national data .Pakistan anti TB association, Green star & EPOS, Indus hospital, Gulab Devi hospital remain the major contributors, the other partners who have contributed to this are, Mercy Corps, ASD, ACD, PLYC, AKHSP, MALC, and many other NGOs and private hospitals.

Among cases notified, 6% are retreatment (Cat-II) cases diagnosed by PPM. There is a mechanism in place for appropriate referral of all presumptive cases of DR-TB.



Figure 11 : Trend TB cases contribution by PPM Model :

Of total private sector contribution 63% were notified by Punjab, and 24%, 10% and 1.3% by Sindh, KP and Baluchistan. Table 5: TB case contribution by province and PPM model

	Punjab	Sindh	КРК	Btan	AJK	GB	FATA	ІСТ	Total
ALL TB cases Notified	221739	72830	45457	10462	5831	2995	4379	2368	366061
TB case notification PPM-ALL	63726	24314	10504	1344	500	213		202	100803
TB CN PPM ALL (%)	28.7%	33.4 %	23.1%	12.8%	8.6%	7.1%	0.0%	8.5%	27.5%
PPM-1	32166	1185	7835	1135	500	213	0		53904
	50.5%	48.7%	74.6%	84.4%	100.0%	100.0 <b>%</b>		100.0 <b>%</b>	53.5%
PPM-2	19155	8659	2428	68	0	0		0	30310
	30.1%	35.6%	23.1%	5.1%	0.0%	0.0%		0.0%	30.1%
PPM-3	10205	3515	186	96	0	0			14002
	16.0%	14.5%	1.8%	7.1%	0.0%	0.0%		0.0%	13.9%
PPM-4	2200	287	55	45		0		0	2587
	3.5%	1.2%	0.5%	3.3%	0.0%	0.0%		0.0%	2.6%



#### TREATMENT SUCCESS RATE

High Treatment success rate was sustained at 93% for incident TB cases enrolled in 2015. Similarly a good treatment success rate was maintained for retreatment TB cases enrolled on treatment.



All province have good treatment success rate which is above 90% except for Baluchistan which is at 87%. Similarly all provinces have good treatment success rate of 94%. However treatment success rate of ICT is low at 65% mainly because of high proportion of EPTB cases, many of which are continued on treatment beyond one year. Treatment success rate of all form incident TB cases is by each province and region is reported in **Figure-13**.



Figure 13: Treatment success rate all form incident TB cases and Retreatment TB cases 2015

#### KEY CHALLENGES IN TB CONTROL (2016):-

#### MISSING TB CASES:-

Although a significant increase in TB case notification is seen in 2016 but still one third of the incident TB cases are missed in National case notification. According to WHO Global Report 2016, Six countries accounted for 60% of the global total: India, Indonesia, China, Nigeria, Pakistan and South Africa.

By far the largest number of TB cases are missed in Sindh, whereas by proportion , high proportion of TB cases are missed in Balochistan, FATA and AJK (Figure-14)





#### Figure 14: Provincial proportion of Notified versus missed TB cases 2016



#### Progress and achievements during 2016:

- Core DOTS: Treatment coverage increased from 62% in 2015 to 69% in 2016 with
- Treatment success rate maintained at 93%
- PPM contributing increase to 27% in national notification.
- Mandatory TB Notifications: The provincial assemblies of two provinces (Sindh & KP) have passed the mandatory TB notification bill.
- Epidemiological review, Pakistan 18-25 November, 2016 by WHO Global TB Program with key recommendation to implement DHSI2 in Pakistan
- National Consultation on CHTB conducted in September 6-7, 2016 in collaboration with WHO, STOP TB Pakistan, Mercy Corps.
- CHTB: STAG subgroup on CHTB established, CHTB guidelines revised with introduction of revised formulations i.e Child friendly medicines.
- National Strategic technical advisory group established and First STAG meeting was held on 29 September, 2016
- TB/HIV: 13092 TB case screened for HIV among 366,061 notified TB cases (3.5%). Capacity building of the various cadres of health care workers. National TOT on basic training module for doctors and Training on M&E module held at national level.
- TB Drug Management: e-based TB drug management information system (TB-DMIS & TB WMIS) is in place.
- E-surveillance system (MIS-DOTS). State of the art as an option for electronic recording and Reporting. This
  was one of the key recommendation of NTP Epidemiological review conducted by the WHO Global TB
  Program.



#### B. DRUG-RESISTANT-TUBERCULOSIS (DR-TB)

#### **Background:**

The emergence of resistance to first line anti-tuberculosis drugs, and particularly of multidrug-resistant TB (MDR-TB), has become a major public health problem in a number of countries, and an obstacle to effective global TB control. The PMDT was piloted with support of GF round 6 and intervention was scaled up with The Global Fund Round-9.

#### **Epidemiology:**

Pakistan is 5<sup>th</sup> among high burden countries for RR-TB with estimated annual cases of around 14000 among notified pulmonary TB cases. In the notified new pulmonary TB cases there are 10,605 RR TB cases (at the rate of 4.2% in new cases) having 2773 among notified retreatment cases (at the rate of 16% in retreatment cases).

#### Achievements/Progress:-

#### DRTB treatment sites :

PR	Punjab	Sindh	КР	Balochistan	AJK	GB	ІСТ	Total
NTP	12	1	4	0	1	1	1	20
TIH	0	7	0	2	0			9
Total	12	8	4	3	1	1	1	29

Table 6: PMDT treatment sites managed by NTP and TIH

**DRTB Enrollment: 2881 DR-TB patients** were enrolled, By the end of 2016, enrollment of DRTB patient reached 11368 and 29 PMDT sites were made functional nationwide.

Among patient enrolled

- 1418 (49%) were male and 1463 (51%) female drug resistance TB patients
- 71% of the DR-TB belong to the most productive age group (14 to 44)



#### Figure-15: Scale up of PMDT Treatment sites and DRTB enrolment over the years

Among all patient enrolled on second line treatment in 2016, 42.7% were registered in PMDT sites in Punjab , 43.9% in Sindh , 8.9% in KP and 2..4% in Baluchistan. Summary of patient enrolled in each PMDT sites is annexed at Annex(MDR) II

Province	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Total	1	25	209	499	884	1563	2642	2660	2875	11358
Puniah			58	105	214	571	946	1053	1228	4175
T unjab			27.8%	21.0%	24.2%	36.5%	35.8%	39.6%	42.7%	36.8%
Sindh	1	25	151	318	457	726	1235	1165	1262	5340
Sinan		100.0%	72.2%	63.7%	51.7%	46.4%	46.7%	43.8%	43.9%	47.0%
КР				76	178	216	327	300	255	1352
				15.2%	20.1%	13.8%	12.4%	11.3%	8.9%	11.9%
Balochistan					35	43	83	70	69	300
					4.0%	2.8%	3.1%	2.6%	2.4%	2.6%
АІК								8	10	18
								0.3%	0.3%	0.2%
GB									4	7
00								0.1%	0.1%	0.1%
						7	51	61	47	166
						0.4%	1.9%	2.3%	1.6%	1.5%

#### Table 7: DRTB patient enrollment by province

**Treatment success rate** : Compared to previous years a decline in treatment success rate from 72% for cohort of patient enrolled in 2013 to 63% for patient enrolled in 2014 is reported .Low treatment outcome were due to high mortality (18%) and lost to follow-up(9%)

Year	Total enrolled	Cured	Tx. Comp	Tx. Success	Died	Failed	Lost to Follow up	Not Evaluated	Still on RX
2010	210	146	5	151	32	7	18	2	0
2010	100%	70%	2%	72%	15%	3%	9%	1%	0%
2011	504	365	22	387	64	24	26	3	0
2011	100%	72%	4%	76%	13%	5%	5%	1%	0%
2012	930	631	39	670	150	42	43	25	0
2012	100%	67%	4%	71%	16%	5%	5%	3%	0%
2012	1570	1092	27	1044	277	65	88	18	3
2013	100%	70%	2%	72%	18%	4%	6%	1%	0%
	2662	1579	43	1622	483	88	258	138	73
2014	100%	59%	2%	61%	18%	3%	10%	5%	3%

Table 8 : Treatment outcome of patient enrolled on second line treatment

A lower treatment success rate was reported among patient enrolled on treatment in Punjab(62%), Sind (63%) and Balochistan(61%). However a good treatment success rate was reported for cohort of patient enrolled in Khyber Pakhtoon Khwa. For details of treatment outcome by province kindly see Annex (MDR) III.



	DRTB Pt. enrolled	Cured	Complete	Died	Failed	Lost to Follow-Up	Not Evaluated	Still under Tx
Total	2642	1652	49	486	94	260	93	8
		63%	2%	18%	4%	10%	4%	0%
Punjab	946	555	29	207	23	91	37	4
		59%	3%	22%	2%	10%	4%	0%
Sindh	1235	770	16	196	60	155	35	3
		62%	1%	16%	5%	13%	3%	0%
K-P	327	245	4	52	8	3	14	1
		75%	1%	16%	2%	1%	4%	0%
Balochistan	83	51		19		8	5	
		61%	0%	23%	0%	10%	6%	0%
ICT	51	31		12	3	3	2	
		61%	0%	24%	6%	6%	4%	0%

Table 9: DRTB treatment outcome of patient enrolled in 2014 by province

A low treatment was also observed on analyzing data segregated by PR managing PMDT sites

Table-10: Treatment outcomes of patient enrolled on treatment in 2014

PR	Cohort size	Cured	Complete	Died	Failed	Lost to Follow-up	Not evaluated
TIH	1,138	63%	1%	16%	5%	12%	3%
NTP	1,509	62%	2%	20%	3%	8%	4%
ALL	2647	63%	2%	18%	4%	10%	4%

#### Introduction of new Drugs:

New drugs (Bedaquiline and Delamanid) acquired through endTB project (IRD/Indus Hospital) and USAID donation programme. In 2016 these drugs were introduced at four PMDT treatment sites

Total 69 patients were put on Bedaquiline and 04 on Delamanid at PMDT sites managed by IRD and Bedaquilline was added to the treatment of 15 DR-TB patients at PMDT sites managed by NTP.

Name of PR	Patients enrolled on Bedaquiline	in	Patients enrolled on Delamanid	in
	2016		2016	
NTP	15		00	
Indus Hospital Karachi	54		04	
Total	69		04	

#### Table 11: DR-TB Patients on New Drugs (Bedaquiline and Delamanid)

6 days Training of Trainers' **(TOT) Workshop** PMDT Staff on DR-TB Guidelines **was conducted** at Lahore and Karachi for Physicians.



## **III. TB LABORATORY NETWORK AND NATIONAL REFERENCE LABORATORY**

#### A. MICROSCOPY NETWORK

The NTP continued to observe policy to diagnose pulmonary tuberculosis through direct smear microscopy. Two smear examined for diagnosis and monitoring of treatment is single smear examination is done at the end of  $2^{nd}$ ,  $5^{th}$  and  $6^{th}$  month.

<u>Microscopy coverage</u>:-Microscopic network was expanded in 2015 with engagement of more Private sector under new PPM initiative supported by GF. Number of functioning laboratories increased to 1705 including 473 private labs compared to 300 in 2015.

	DHQ	THQ	RHC	BHC	тсн	Parastatal	TB Clinic	Others	NGO	PPM	Total DCs	Population	Avg pop/DC
Punjab	32	75	294	7	14	37	13	33	31	248	784	104,402,438	133,166
Sindh	16	47	96	19	9	7	8	30	47	107	386	43,365,989	112,347
КР	18	14	81	9	5	10	14	49	15	90	305	25,293,088	82,928
B.Tan	27	2	29	22	1	1	3	8	1	4	98	9,370,938	95,622
FATA	4	1	4	1	0	0	2	12	0	0	24	4,442,748	185,115
GB	4	0	2	1	0	0	0	11	4	6	28	1,266,654	45,238
AJK	8	8	21	7	0	0	9	1	0	13	67	4,460,102	66,569
ICT	0	0	2	0	4	2	0	0	0	5	13	2,201,378	169,337
Total	109	147	529	66	33	57	49	144	98	473	1705	194,803,336	114,254

Table 12:- Microscopy services coverage by province in 2016

By end of 2016, one microscopy laboratory was serving a population of 114,354 on average, microscopy services coverage varies depending on density population and geographical terrain from 45,238 in GB to 169,337 in ICT.

#### Fig:16-Microscopy services in public and private sector in 2016 compared to 2015





<u>Work Volume in Microscopy Laboratories</u>: Coverage has improved with engagement of private laboratories, but as work volume of these laboratories is suboptimal, proportion of Laboratories performing less than 500 smears has increased









#### Laboratory Performance indicators: -

- i. Positivity rate among Presumptive TB Cases is showing gradual decline from 17% in 2010 to 13.7% in 2015 as total number of notified cases is improving this decline is assumed as an indicative of improved suspect referral to laboratories.
- **ii. Positivity rate among follow up examination** which is considered more sensitive indicator of quality of smear microscopy is showing gradual increase (3.4% in 2011 to 4.6% in 2016) but still lower than expected.



Figure 19: Trend presumptive TB cases (PTB cases) tested and positive rate on AFB microscopy

<u>Quality Assurance Programme of microscopy services</u>: EQA by Blinded rechecking remained corner stone for quality assured microscopy services. 1375 DCs (including 271 DCs of PPM-GF) in 146 districts were covered by EQA by December 2015.

Continued support was provided for quality assured microscopy services for human resource development, quarterly surveillance meeting and provision of laboratory supplies (see annex)



Efficiency of microscopy services is gradually improving with decline of proportion of false positive and false negative reporting. Decline in false positive error was seen between 2006-2011 but slight increase is seen again in 2012-13. Similarly decline in false negative error was seen 2006 to 2012 but an increase is observed in 2013 from 0.7% in 2012 to 0.9% in 2013, there was decline in both false positive and false negative in 2015 and 2016. However 10 % of centers have yet to achieve level of acceptable performance. See annex II & III for details. However for district with low number of errors despite suboptimal routine laboratory performance indicator, there is need to critically review effectiveness of EQA



#### Figure 21: Trend Proportion of False Positive and Negative Error

#### **B. GENEXPERT NETWORK:**

GeneXpert scale up continued in 2016 and by the end of 2016, 73 machines were installed across country (Phase-1)In year 2016, a total of 127,790 Xpert cartridges were used. Including 67,000 collectively by NTP sites and 60,000 by the TIH supported sites. Among all tested 36,984 were detected positive for MTB and 3331 rifampicin resistant cases were detected.







**Diagnostic Yield, upfront versus Follow-on to Microscopy**: All NTP/PTP xpert sites most of the testing were performed as follow on to microscopy and 2875 RR/TB cases were detected on testing of 66754 cases.



Figure23: Diagnostic yield RR with upfront xpert testing (TIH) versus follow on to microscopy (NTP)

Compared to Xpert testing sites, upfront Xpert testing was performed in TIH Xpert sites , a total of 61021 xpert testing were performed at Xpert sites and 404 RR TB cases were diagnosed

			# Tested				# MTB +					F	Rif Resista	nt	
	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2012	2013	2014	2015	2016
ICT	4645	4896	7083	10578	12788	92	3161	2718	1978	2581	321	375	366	338	266
Punjab	2722	3120	10267	13415	24473	128	1475	1780	4464	6026	438	454	840	930	1172
Sind	4745	2240	7191	12155	16741	285	3468	1842	4853	5877	563	532	1012	949	1090
КР	415	174	551	1099	2116	3	239	164	387	541	76	47	89	91	92
Btan	2335	2497	4797	5707	9195	63	1121	1124	2352	2254	264	257	361	298	275
FATA		69	269	503	639			35	111	233		3	10	13	16
AJK				461	778					138				7	15
GB				22	40					7				0	1
Total NTP	14862	12996	30158	43940	66770	571	9464	7663	14145	17657	1662	1668	2678	2626	2927
тін		4030	26094	46695	61021			810	4820	5175		96	341	345	404
Total	14862	17026	56252	90635	127791	571	9464	8473	18965	22832	1662	1764	3019	2971	3331

Table 13 : Xpert testing and MTB and Rifampicin resistant

#### **GENEXPERT SCALE UP PLAN 2017**

NTP Pakistan in NFM grant planned a scale up of Xpert machines: As per plan 60 machines were procured in 2016 including 4-module 54 and 16-Module (Phase-II) machines.

Plan for scale up of GENEXpert was developed in consultation with provincial programmes, in November 2016, it was agreed with consensus that GeneXpert will be scaled in the country and machines will be installed at following health facilities.

- All tertiary care hospital
- All DHQ hospitals , Punjab , Sindh , KP and Baluchistan (16-Module in DHQ of Punjab and selected DHQ in Sindh and 4 module in DHQ KPK and Baluchistan )
- THQ hospitals ;4 module in all THQ hospital in Punjab and selected THQ Sindh and KPK

Funding were seured for GeneXpert scale up plan using saving NFM grant in December 2016 for procurement of 259 additional machines including 4-module 198 and 16-modules 61 machines (Phase-III)

Province	District	Tehsils	TCH	ТВ	BMU	PI:GX_E	Baseline	PII: G	x_NFR_	PIII:NI	M-RP	To	tal
				Clinic		(Dec	-'16)	In Pip	oe Line	-G	ix-		
						04	16	04	16	04	16	04	16
						Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod
ICT	1	0	4	0	7		1	1	0	2	1	3	2
Punjab	36	135	19	13	510	27		30	3	74	36	131	39
Sindh	24	128	22	8	260	11		15	2	67	17	93	19
КР	24	73	8	14	198	23		0	1	15	6	38	7
BTan	29	2	2	3	89	3		4	0	28	1	35	1
GB	10	0	0	0	27	1		2		6		10	0
AJK	10	8	0	9	54	2		2		6		9	0
FATA	7	1	0	2	22	6		0				6	0
Total	141	347	55	49	1167	73	1	54	6	198	61	325	68

Table-14 : Xpert coverage by December 2016 and scale up plan 201	Table-14 : Xpe	rt coverage by	December 2	2016 and sca	le up plan 2017
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#### C. LINE PROBE ASSAY:

NTP plans to start LPA in seven DST laboratories. In year 2016 three DST laboratories started LPA first line.

In May 2016 LPA-SL and short course treatment regimen was approved by WHO. Capacity developed on LPA first line will help these laboratories to offer LPA –second line testing and this will help in introduction of short course in Pakistan

LPA performed on MDR strains have shown prevalence of KATg in 88.7% and InHA in 6.7% and combined InhA and KatG in 4.7%

		KatG	InhA+katG	InhA
MDR	838	743 (88.7%)	39 (4.7%)	56 (6.7%)
mono H	73	57 (78.1%)	2 (2.7%)	14 (19.2%)
Mono R	182	0	0	0
RH_Susp	438	0	0	0
	1531			

Table -15: Prevalence of Resistant conferring mutation for INH

#### D. CULTURE & DST LABORATORY NETWORK:

With support of Global fund grant TB culture /DST laboratory network expansion has made much progress. TB culture and DST services are now provided mostly by the TB culture and DST laboratories established with support of the Global fund. Table 16 below is showing the PMDT sites and Linked TB culture and DST laboratories in year 2016. For list of PMDT sites in 2016 and linked Culture and DST laboratories see annex MDR-1

TB culture Services: In year 2016 three more culture laboratories started functioning. TB culture workload increased from 45,000 (2016) to 54,000 in 2016. Treatment monitoring of patient on DRTB treatment was main reason for performing culture with the exception of NRL where majority of culture were performed for diagnosis and DST.



	Lab	2011	2012	2013	2014	2015	2016
1.	NRL -ICT	9754	5215	10668	10009	12482	13848
2.	PRL-Punjab	1577	1739	2567	4875	6111	5273
3.	PRL NHM					1612	5430
4.	GDH_lahore	215	2339	3086	5118	4470	4907
5.	PRL-Sindh	4209	5356	5757	5391	5555	5206
6.	ICD Kotri				3748	4440	3579
7.	PMCH Nawabshah						937
8.	GMMCH Sukkur						515
9.	PRL-KPK	823	760	3402	7097	7803	7054
10.	DTO Abbottabad				574	1770	2603
11.	PRL-Bal	146	375		1326	1505	1521
12.	Mirpur-AJK						889
	Total	16724	15784	25480	38138	45748	51762

#### **Table 16**: Culture Laboratories performance for 2016

**TB DST Services:** In year 2016 three DST laboratories continued providing services for clinical management. Due to delay in functionalization of two DST laboratories in Punjab and One in Baluchistan, DST services could not be started by these laboratories. TB laboratory in the Indus hospital with support from Global fund continued offering DST services to selected PMDT sites in Sindh and Baluchistan. DST work volume in shown below.

Laboratory Name	2011	2012	2013	2014	2015	2016
NRL -ICT	491	1025	1388	834	1391	2115
PRL-Sindh				148	621	720
PRL-KPK				398	577	394
Sub-Total (Public)	491	1025	1388	1380	2589	3229
Indus	NA	NA	727	852	573	599
АКИН	NA	NA	2796	1865	1230	925
Sub-total (Private)			3523	2717	1803	1524
Grand Total			4911	4097	4392	4753

Tabl-17: DST work volume in Public and private sector TB laboratories

After the functionalization of public sector DST laboratories, patient referred to private sector DST laboratories has reduced significantly and now only few patient are referred to PMDT for enrollment with test result from AKU.

<u>Surveillance of drug resistance in RR/MDR strains</u>: High Floroquinalone resistance is the main challenge in the management of DRTB, FQ resistance in MDR patients is dwindling between 45-47%.

Tuble 10. National field of Legislance in Mymbrid D cases								
	2013	2014	2015	2016				
MDR with DST available of FQ	2213	2359	2292	2366				
FQ resistance (n)	1121	1114	996	1127				
FQ resistance (%)	50.7%	47.2%	43.5%	47.6%				
SLI Resistance	140	193	145	163				
SLI Resistance(%)	6.3%	8.2%	6.3%	6.9%				
XDR	99	128	99	130				
XDR (%)	4.5%	5.4%	4.3%	5.5%				

#### Table 18 : National Trend of FQ Resistance in RR/MDR TB cases

Proportion of FQ resistance in RR/MDR strains from KP are showing gradual decline but a significant increase is reported in Sindh whereas sustained high proportion of FQ is seen in Punjab

	Punjab +AJK+ICT NRL	КРК	Sindh (PRL-Sindh)	Sindh (IHK)	AKU
# SLDST:2014	623	70	148	607	911
<b>#FQ Resistance</b>	315	31	45	227	496
(%)	(50.6%)	(44.3%)	(30.4%)	(37.4%)	(54.4%)
# SLDST :2015	894	189	557	414	238
FQ resistance	475	77 (40,7%)	171	156 (27.7%)	117
	(55.170)	(101770)	(30.776)	(37.770)	(49.270)
# SLDST :2016	1065	158	568	465	110
FQ resistance	564	59	270	173	61
	(53.0%)	(37.3%	(47.5%)	(37.2%)	(55.5%)

Table 19: FQ resistance trend in RR/MDR strains by Province/regions

#### E. NATIONAL TB REFERENCE LABORATORY

**ROUTINE DIAGNOSTIC SERVICES**: In year 2016 National Reference Laboratory provided DST services to fifteen PMDT sites including ICT, AJK, GB, Baluchistan and eleven in Punjab. Besides these NRL is providing services to various health facilities in Rawalpindi and Islamabad districts:

**Drug susceptibility testing;** since 2009 NRL is providing drug susceptibility testing for clinical management and surveillance purpose. With the introduction of GeneXpert, phenotypic DST for clinical management is now done mostly of patient reported Rifampicin resistant. However phenotypic DST is done on pediatrics and extrapulmonary specimen regardless of RMP result on Xpert for surveillance purpose. In year 2015 proportion of MDR in isolates tested was 12.2% in New cases and 72.8% in retreatment cases (figure 7)



Figure 24: NRL phenotypic DST trend. MDR reporting in New and previously treated cases


		New	Previously Treated	Unknow History	Total
	FIRST LINE DRUG RESISTANCE				
1.	Among patients reported in (i) number of patients with available DST results for isoniazid(H) and Rifampicin (R)	860	895	360	2115
2.	Among patients reported in (ii) number of patients with resistant to H but not R (%)	67 (7.7%)	92 (10.2%)	36	195
3.	Among patients reported in (ii) number of patients with resistant to R but not H	6 (0.6%)	22 (2.4%)	13	41
4.	Among patients reported in (ii) number of patients with resistant to R and H (MDR-TB)	105 (12.2%)	652 (72.8%)	270	1027
	SECOND LINE DRUG RESISTANCE				
Α.	Total number of MDR-TB patients with DST results for any fluoroquinolone (FQ) and any second-line injectable agent (2LI)	111	672	282	1065
В.	Among MDR-TB patients reported in (i) number of patients susceptible to both FQ and 2LI	53 (47.7%)	310 (46.1%)	126	489
C.	Among MDR-TB patients reported in (i) number of patients with any resistance to FQ	56 (50.4%	354 (52.6%)	154	564
D.	Among MDR-TB patients reported in (i) number of patients with any resistance to 2LI	11 (9.9%)	56 (8.3%)	22	89
E.	Among MDR-TB patients reported in (i) number of patients with any resistance to both FQ and 2LI (XDR-TB)	9 (8.1%)	48 (7.1%)	20	77

**Table 20 :** Surveillance of drug resistance against First and second line anti TB drugs

**EQA Scheme for DST:** NRL PARTICIPATES IN ANNUAL SCHEM OF EQA of DST coordinated by SNRL-Antwerp Belgium is a regular activity organized by Supranational Reference Laboratory Network. NRL has sustained its proficiency in round 20<sup>th</sup> of annual panel testing coordinated by SNRL Antwerp Belgium. Besides NRL, two laboratories AKU (SRL) and IHK regularly participate in EQA scheme. Both laboratories have sustained proficiency for FLDST and SLDST

Table 21: NRL Panel Testing for DST Results

		2011	2012	2013	2014	2015	2016
		R-18	R-19	R-20	R-21	R-22	R-23
First Line	Rifampicin(R)	97%	100%	89%	100%	100%	100%
Drug	lsoniazid ( H)	97%	100%	100%	100%	100%	100%
	Ethambutol	96%	100%	100%	100%	100%	100%
	Streptomycin	93%	100%				
	PZA			100%	100%	100%	100%
Second	Ofloxacin	100%	100%	100%	100%	100%	100%
Line Drug	Amikacin	100%	100%	100%	100%	100%	100%
	Capreomycin	93%	100%	100%	100%	100%	100%
	Kanamycin	97%	100%	100%	100%	100%	100%

**NATIONAL EQA SCHEME FOR DST**: - NRL has been organizing National EQA scheme for DST since 2009, Subsets of Panel strains received from SNRL are sent to both public and private sector TB laboratories who express interest in participation. In year 2016, 2 public sector laboratories (PRL KPK and PRL Sindh) qualified in DST for both first and second line DST. Whereas four private sector laboratories participated and one qualified in Proficiency testing for first line DST testing for first line DST



Table 22: Participating	; Laboratories in Nationa	al EQA Scheme for DST
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### D. Monitoring and Supervision (Laboratory Network):

Monitoring and Supervision remains the keystone of TB laboratory network) The M&E staff including Mand E officer laboratory and Senior laboratory supervise /support provide on the job training to staff working in the **microscopy** and GeneXpert the Network.

Table	<b>23</b> :	M&E	staff	for	ТΒ	laboratory	Network
-------	-------------	-----	-------	-----	----	------------	---------

	NRL	PRL Upper Punjab	PRL S. Punjab	PRL Sindh	PRL KP	PRL Baluchistan	AJK	GB	FATA	Total
*Senior /M&E Officer LAB	*2/2	1/1		1/1	1/1	1/1	-	-	-	6/6
Senior Laboratory Supervisors (SLS)	3/4	4/4	3/3	5/5	4/4	3/5	1/1	0/1	1/1	24/28

Joint monitoring visit are conducted by Programme monitors and laboratory staff. For microscopy network Supervision and monitory visits are conducted to cover the quarterly intra-district meetings (IDMs), Intermediate laboratories at district level (IDLs), peripheral microscopy centers and quarterly laboratory surveillance meetings held at provincial level.

**Monitoring of culture/DST and Xpert sites** includes both desk monitoring of performance indicators and on site visit by technical staff of NRL (Senior Microbiologist & Molecular Biologist).During on site visit to laboratories National staff is accompanied by relevant provincial technical staff for purpose of capacity building and follow up of problem identified.



	QUARTER	Punjab	Sindh	КРК	B-Tan	AJK	GB	FATA
Culture /DST	Sub-Total	4	8	4	1	0	0	17
GeneXpert/LPA	Sub-Total	13	5	5	1	3	0	27
Microscopy	Sub-Total	17	4	21				42
TA/Training	Sub-Total	1	6		1			8
	GRAND TOTAL	35	23	30	3	3	0	94

### Table24: Technical support/Supervisory visit – BY NRL staff

### F. Human resources capacity development:

In view of Xoert scale up taking place in the country, in year 2016 more staff was trained on Xpert

S.no	Training category	Fed	Punjab	Sindh	KP	<b>B</b> _tan	AJK	GB	FATA	Total
1	Initial training on microscopy (10D)	6	0	56	59	19	21	0	10	171
7	Refresher training on Microscopy (4D)	0	0	50	52	5	10	0	10	127
2	Initial training for DLS(10D)	0	6	5	0	9	0	4	0	24
3	Non Lab supervisors on TB lab supervision (3D)	0	0	0	0	3	0	0	0	3
6	Initial training on Gene- Xpert(5D)	16	24	13	8	5	0	0	6	72
4	Initial training on culture and new diagnostics (2W)	0	1	3	1	3	0	0	0	8
5	Initial training on DST(2W)	0	3	1	1	1	0	0	0	6
	Total	22	34	128	121	45	31	4	26	411

#### Table 25 : Staff trained in 2016



### IV. SURVEILLANCE, MONITORING & EVALUATION:

Surveillance is integrated in the M&E plan and based on national indicators to measure performance. NTP has adopted "WHO recommended Revised Reporting & Recording Tools-2013" for data collection to strengthen the national surveillance system for TB control activities. The National TB M&E Plan was developed in conjunction with the NSP, 2011-2015 with the context of internationally accepted theoretical framework for M&E. This framework fostered the systematic collection of information on the input, process, output, outcome and impact indicators and the tracking of progress towards set targets.

### The objectives of the National TB M&E Plan, include:

- Contribute to strengthening TB M&E systems in Pakistan.
- Monitor/track progress of the implementation of planned activities.
- Evaluate the outcomes and impact of the control interventions.
- Coordinate the dissemination of M&E information.

### Strategies to achieve these objectives were:

- · Improving routine data collection,
- Strengthening surveillance,
- · Improving data reporting through data quality audits,
- · Improving monitoring of TB Drugs and other commodities, and
- Strengthening partnerships and collaboration for outcome and impact evaluation.





**M&E unit at national level**. It comprises of Manager M&E, data surveillance Officer NPO federal & M&E Officers who have been assigned regions for oversight, monitoring and provincial / regional technical support. In provinces clusters of districts are monitored by National Program Officers (GF supported) who report to Provincial Technical Officer (PTO) at PTPs.



M&E function is performed and based on three essential components:

- a) Desk review of data and reports
- b) Field visits
- c) Quarterly surveillance meetings to review the data and quarterly performance

### M&E in the era of devolution and END TB strategy:

During the year key development which took place was devolving (July 2016) the M&E Human resource i.e NPOs & M&E officers to provinces with the aim to establish robust M&E mechanisms at the level of PTPs. There are key challenges which need to be addressed in context of End TB strategy and devolution.

- END TB Strategy and monitoring of key indicators for implementation.
- M&E/ Surveillance system scope, functions, roles and responsibilities in context of devolution. The aim is to
  have a robust provincial M&E/Surveillance unit with strong coordination mechanisms in place to address
  the issues and timely actions at appropriate level.
- Role of districts to implement the End TB strategy
- Future Role of National program officers (NPOs)
- Integration of M&E activities at all levels (CORE DOTS, DR TB, Laboratory, PPM, HDL, TB/HIV, and ACSM).



### Figure 26 : NTP M&E visits Analysis

#### Way Forward:

- DHIS-2 implementation in country context with support of WHO Global TB program
- · Capacity building of the M&E/ data staff on DHIS-2
- · Revision of M&E training module / aligning it with END TB Strategy indicators
- Capacity building of the country M&E team



### **V. OPERATIONAL RESEARCH**

Research plays an important role in the design of new strategies to ensure optimal utilization of resources and maximize the programme outcomes. Research is a key strategic area identified in the National strategic and operational (PC1) plans as well as the new END TB strategy (pillar III) Pakistan. The strategy describes operational researchers as a core component of NTP work. Designing and conducting locally relevant operational researchers can help in identifying problems and workable solutions, testing them in the field and planning for the scaling up of activities.

The main objectives of the unit are;

- Providing research leadership to establish National research/development agendas, attract resources, new researchers and research groups, and develops Institutional networks
- Capacity building activities of NTP and PTP staff on research and surveillance including data management and analysis
- Providing management capacity for carrying out specific research projects to ensure relevance, quality, timeliness, efficiency and accountability
- · Developing Critical mass of personnel with Up-to-date R&D skills
- Enabling the Means and opportunities for participating in international R&D
- · Developing road maps for new researches based on need and priority of NTP
- Develop Collaborations with international academic institutes to perform international standard Quality Research.

### Main Achievements (2016)

1. Successful completion of Pakistan Structured Operational Research and Training Initiative course (SORT IT) in 2016.

National TB Control Program -Pakistan is developing capacity of new researchers and in search of performing good quality Research. We have a well-defined Research unit headed by a qualified trained epidemiologist and researchers who has already got benefit from the Operational Research courses arranged by the Union.

Research Unit, National TB Control Program, Pakistan has a honor to successfully complete the first international SORT IT Operational Research course in Pakistan under the joint collaboration of Global Fund and WHO-TDR. Course was conducted organized in Islamabad. The course was facilitated by the two international(UNION) Dr. Sven Gudmund Hinderaker (Norway), Dr. Einar Heldal (Norway), and Dr. Ajay MV Kumar (India) and three national facilitators and Dr Razia Fatima (Pakistan) and Co-facilitated by Aashifa Yaqoob and Mahboob-ul-Haq from NTP Pakistan. Module 1 & 2 was conducted from 21st March – 2nd April, 2016 (Proposal writing & Data analysis) and Module 3 on 11th – 18th November, 2016 (Manuscript preparation).

Among six participants who successfully completed the course , 5 have already published their paper in international scientific journals and one is under review process.

2. National inventory study to measure TB under-reporting in children in 12 selected districts in Pakistan.

Every day, up to 200 children lose their lives to tuberculosis, which is a preventable and curable disease. In 2015, there were an estimated 1 million children who developed TB and above 60% were missed from health systems.

TB in children is often missed or overlooked due to non-specific symptoms and difficulties in diagnosis. This has made it difficult to assess the actual magnitude of the childhood TB epidemic, which may be higher than currently estimated. Most patients in Pakistan visit at least 4-5 healthcare providers before receiving TB diagnosis, resulting in long treatment delays. Pakistan inventory study carried out in 2012 showed that 27% of TB cases were not notified to NTP and underreporting was 2.5 times higher in age group < 15 years.



NTP, Pakistan conducted a National inventory study in collaboration with WHO with the aimed to quantify the level of under-reporting to the national surveillance system, among diagnosed childhood TB cases. A surveillance system was established among all non-NTP providers in randomly selected 12 districts across Pakistan from April to June 2016. Record linkage was done to measure the underreporting.

Out of 8,056 enumerated children, 7125 were presumptive TB cases. Among the presumptive child TB cases, 5,096 child TB cases (about 10% of them bacteriologicall-confirmed and the rest clinically diagnosed) found as part of the study and not reported to NTP and an additional 159 cases that were reported to NTP. Under reporting from the private sector was about  $\frac{3}{4}$  of children that missed from national surveillance system. The study estimated that the proportion of cases notified to the NTP was low. TB surveillance should be strengthened to reduce under-reporting in children.

3. GIS based Innovative strategies to enhance yield from contact tracing among drug resistant TB in Rawalpindi and Islamabad.

WHO recommends contact investigation in close contacts is defined as "living in the same household with TB index cases, either with drug-susceptible TB or with MDR-TB". Currently in Pakistan there is no standardized routine implementation of household or community-based contact tracing. A pilot study in 2013-15 under the TB Reach Wave 3 project detected more than 4000 TB cases.Based on this experience NTP is now conducting GIS based Innovative strategies to enhance yield from contact tracing among drug resistant TB patients. The project introduces active contact investigation in Rawalpindi and the Capital Territory utilizing all drug resistance notified cases as index cases.



Household contacts, i.e. those normally resident or sharing the same airspace, are verbally screen initially, followed by a widening circle of close community contacts (50 m). The project test all presumptive TB cases by Gene-Xpert identified in the screening for which the evidence available in published articles suggest there is 60% increase expected. The project has started the contact tracing from 1st October 2016. All the data is being entered in GIS enabled mobile phone.

Till 31<sup>st</sup> May 2017, total of 1918 individuals within household and 50M around the index cases of DR TB patients are screened for TB. Among them 370 are found presumptive TB cases and out of them 16 are found TB positive. This activity will continue till the end of September 2017.



1. 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

NTP is conducting a randomized controlled trial study entitled: 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: The aim is to enable the program to effectively implement multi-component MDR TB management. Two types of service delivery models namely community based (1week hospitalized and early discharge to peripheral care) and hospital-based (2 months hospitalized and late discharge to peripheral care) will be studied for its effectiveness and cost-effectiveness in the low resource settings of Pakistan. In 2016, 100% of the sample (patients) has been enrolled in the study in three tertiary care hospitals i.e. Gulab Devi Lahore, OJHA Karachi and Samli Sanitarium Murree. 90% of the patient's outcomes have been declared and the remaining are being followed for treatment outcomes.

# 2. KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) REGARDING HOUSEHOLD INFECTION CONTROL PRACTICES AMONG MDR/XDR TB PATIENTS, IN PAKISTAN

This Research study "Funded by SAARC Tuberculosis and HIV/AIDS (STAC) is facility based cross-sectional survey to assess Knowledge, Attitude and Practices of household infection control measures among MDR/XDR-TB patients and family members. Data were collected through a structure questionnaire regarding household infection control measures from 150 patients and 150 household members who were under treatment in five selected Programmatic Management of Drug-resistant TB (PMDT) sites. These sites were; Gulab Devi Hospital, Lahore, Samli Sanatorium Muree, Ojha Hospital Karachi, LRH Peshawar and Leprosy Hospital Rawalpindi. Each hospital remained with 30 MDR/XDR patients and 30 households which were selected using random sampling from the hospital register.

The median age of respondent was 30 with majority of males (66%) than females. The overall knowledge level of the patient's family members was better (94.7%) as compare to patients (85.3%), known that tuberculosis is contagious and were aware about precautions. The majority of respondents had several misconception about TB transmission, 26.9% of patients and 37.3% family members responded that the source of TB transmission is sharing food with infected person.

These findings demonstrate the need to improve the knowledge attitude and practices among drug resistant patients and also standardize infection control infrastructure in drug-resistant TB setting. Furthermore, the TB control program needs to consider advocacy, communication, and social mobilization for addressing these gaps.

### Participation in UNION Conferences:

The 47th Union World Conference on Lung Health was held in Liverpool, UK, from 26 to 29 October 2016. Research Unit presented the published article i.e. "Yield of Facility-based Verbal Screening amongst Household contacts of Patients with Multi-drug Resistant Tuberculosis in Pakistan" and <u>"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?"</u>.

In addition the international Ethics Advisory Board meeting by the Union was attended by Dr Razia Fatima as member of EAG Union

### Articles Published in 2016 :- All publication can be accessed at <u>http://www.ntp.gov.pk/resource.php</u>

Below is list publication in 2016

Home >> 0	Resource Center
Resea	rch
>	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?
	[Published: PLoS ONE 11(11):e0165813. doi:10.1371/journal.pone.0165813, November 29,
	2016] [620 KB]
>	Use of Xpert® MTB/RIF assay in the first national anti-Tuberculosis drug resistance survey in
	Pakistan [Published: INT J TUBERC LUNG DIS 20(4):448-455 © 2016 The Union, February 01,
	2016] [297 KB]
2	Population Based National Tuberculosis Prevalence Survey among Adults (>15 Years) in
	Pakistan, 2010-2011 [Published: PLOS ONE   DOI:10.1371 / journal.pone.0148293 February
	10, 2016] [656 KB]

### Way Forward:

The future activities of the Research in collaboration with M&E Unit in 2017 will be as follows:

- · Implementation of second Pakistan SORT IT course in 2017
- DHIS 2 Training workshop for online TB data in the country with support of WHO Geneva HQ.
- Final report writing of Child TB Inventory study to detect Under-reporting of child TB Cases supported from WHO in 12 Districts
- Analysis and report writing of "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"
- To collaborate with international institutions such as University of Bergen, London school of hygiene, John Hopkins University and University of York to enhance capacity at National level.



### VI. PARTNERSHIP, COMMUNICATION & RESOURCE GENERATION:

Advocacy ,communication and Social Mobilization (ACSM) creates positive behavior change, influences decisionmakers, and engages and empowers communities to change resulting in increased case detection, treatment and overall awareness about TB. It is critical to note that advocacy efforts put pressure on policy makers to increase the supply side of TB services while communication and social mobilization efforts generate demand for services.

TB continues to be a significant challenge for global public health. In 2016, TB is still a major cause of death and suffering worldwide. TB control is a global public health issue and must be conceived and carried out along with the basic principles of equity, human right to health and social protection. Despite the efforts being done in the health programmes in the form of treatment and care, experience and research has shown that Advocacy, Communication and Social Mobilisation (ACSM) creates positive behaviour change, influences decision-makers, and engages and empowers communities to change resulting in increased case detection, treatment and overall awareness about TB. It is critical to note that advocacy efforts put pressure on policy makers to increase the supply side of TB services while communication and social mobilisation efforts generate demand for services.

ACSM is a key determinant of the outcomes of Pakistan's TB control Interventions. It is through the use of ACSM tools that agendas are set, public awareness on specific85 health issues is raised and communities are mobilized to adopt early health seeking behavior and treatment adherence.

ACSM Unit has demonstrated leadership in designing, planning and executing ACSM interventions and further institutionalizing health communications for TB in the country. Vision of eliminating differential of quality of "health communication" products, services and information between public and private sectors has been introduced. NTP, Pakistan is being recognized as a leader on producing high quality advocacy, communication and social mobilization products.

Numbers of national strategic/policy documents have been produced under ACSM, including National ACSM Strategy and Operational Guidelines; National M&E Framework; Quality Assurance Manual (Trainer and Trainee guide) for IPC; Social Marketing Plan; ACSM Resource Center Development Guidelines; and National Logistic & Management Information System.

To support Pakistan's TB control interventions, the NTP has developed a partnership network with a diverse range of partners that include national, multilateral and bilateral agencies; international NGOs, Pakistan Paediatric Association, Pakistan Chest Association and national NGOs. Recently, NTP has also partnered with media outlets and telecommunications companies in this expanding partnership network.

Advocacy seminars with the media

Advocacy seminars was arranged at the national level to inform media and health professionals, as well as other key stakeholders, about the current situation on TB in Pakistan and to share the initiatives being taken by NTP at the national and provincial levels.

One of the objectives of the seminars held in 2016 was to motivate the participants to prioritize TB control on their reporting agendas in order to help create a conducive environment for implementation of ACSM activities.

### Development and dissemination of ACSM resource material

The ACSM Unit developed various types of ACSM resource material including newsletters, posters and brochures, fact sheets, badges, T-shirts, key chains, pens, caps and bags. These materials and mementos were widely distributed at the national, provincial and district levels during different activities including World TB Day 2016.



### World TB Day 2016

National TB Control Program had designed a comprehensive communication strategy to aware the General Public regarding TB diagnosis, care and treatment. Multiple interventions were planned to celebrate the World TB Day 2016 by using different tools like media, interpersonal communications, to deliver the TB message to the targeted population. Along with a National, Provincial & Regional seminars to sensitize the target population through media, several road shows were planned through a mobile theatre for (Interpersonal communication).

### • National Seminar:

Like every year a national event to commemorate World TB Day has been organized at Nazrya Pakistan Auditorium, F9 Park, Islamabad. Mrs. Saira Afzal Tarar Minister of State for National Health services Regulations & Coordination was the chief Guest on the occasion.

### · On-airing of TV spots (TB related messages)

250 TV commercials were on aired on different News & Entertainment Channels

### On-airing of Radio campaign

Radio particularly FM is a popular entertainment media. It is also cost effective. Context specific TB message campaigns were developed and broadcasted through radio channels in selected districts. Total 869 spots were on-aired on different FM & Pakistan Radio Stations.

### Newspaper insertions/ advertisement back/front side

Advocacy messages aiming at promoting TB as a national health agenda were designed and placed in selective newspapers, across the country. Total 48 insertions in different Newspaper were given on World TB Day.

#### • Special Supplements on WORLD TB day:

Special 1 full page supplements were given on WTD in different Newspaper containing messages of President, Prime Minister & Minister of State for NHSR&C.

• Talk Shows:

Special Interviews in all leading Newspapers & Magazines. Special talk shows were on-aired on Express TV, PTV world, ARY, ATV, Royal TV, Neo TV, Channel 5 & Radio Pakistan.

### • City Branding:

All the main roads were branded with TB messages for three days (from 22<sup>nd</sup> March to 25<sup>th</sup> March) (2 main bridges of Islamabad were also branded)

### 47th UNION CONFERENCE ON LUNG HEALTH, Liverpool, UK

**Exhibition booth on:** NTP also participated in the 47th Union World Conference on Lung Health held in Liverpool, UK on 26 to 29 October 2016. The occasion presented an excellent opportunity to raise awareness on TB among people from different walks of life and age groups at international level. NTP set up an exhibition booth, where a variety of ACSM material including brochures, guidelines, posters and handouts were available for the public to benefit from.

**Friends of Pakistan Meeting:** Friends of Pakistan meeting was the key event of the conference which was largely attended by the donors' community and international technical experts and friends of Pakistan. NTP conducted "Friends of Pakistan" meeting during the IUTLD conference to share country's achievements and to attract donors for funding in Pakistan. The meeting was chaired by Dr Muhammad Hashim Popalzai, Additional Secretary MNHSR & C.





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CLARK OR PARTY 3

### USAID honors Pakistan in the Global Fight against Tuberculosis

Evens year on eve of World TB Day, USAID honors a encentry for their performance and political convertion and an emercing a key available health longer. This year PASISTAN was benered by MARD in Im-Washington D.C. on its addition of the managing Co. MOR-TB-in Pokiston Pokiston ranks among the world's top ten sportvice with high bardens of both TR and MDN-18. The Achievement Award recognizes the



attory political associationant and loadership by Pakistan's Montery of MHIMAE; to such the grounds of MCH. There the country through impresent case detectors and interference or slow

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### A. Provincial Achievements

### 1. Khyber Pakhtoon Khwa

- World TB day Celebration, Enhancement of TB awareness through TB Weeks, Advocacy seminars and Electronic & Print media campaigns.
- Currently, PTP KPK is working on developing by-laws for Tuberculosis Notification Act. Also making efforts to secure more funds in ACSM for implementation of Tuberculosis Notification Act through extension of their PC-1 i.e. "Strengthening of TB Control Programme in Khyber Pakhtunkhwa Phase – II (ADP Scheme)"
- The province-specific, ACSM strategy (Advocacy, Communication & Social mobilization) was developed.
- Dissemination of IEC material to districts of KPK.

#### 2. Baluchistan

- World TB day celebration including a seminar with Govt. official and other stakeholder for advocacy and sensitizing to media and other professionals. Member of provincial Assembly Dr. Shama Ishaq was the chief guest on the occasion of World TB day.
- HDL activities conducted
- · CBO/NGOs meeting held
- Press conference
- · IEC and other promotional material like brochures, mugs, pens etc. were distributed
- Participation in Army mela in Askari park held on 23 March 2016
- Participation in Sibi mila in Feb 2016

#### 3. Punjab

- Seminar in collaboration with the Geo Jang Group under Mir Khalil ur Rehman Society was held on World TB
  day in which recommendations from different segments of the society were sought out for the
  improvement/betterment of TB care and treatment of patients. The topic selected "WHO IS RESPONSIBLE?"
  - I- Government
  - II- Civil Society
  - III- Health Care Providers
  - IV- Individuals



The recommendations of all above stake holders, was shared with the concerned quarters for onward implementation accordingly. A follow up mechanism on these recommendations was also devised in collaboration with Jang Geo Group.

 Mobile Awareness Theater The mobile theater was designed in such a way that it would have a wooden stage on an open truck with a sound system where TB songs were played, messages were delivered during travel and performing theater by the artists on different points. The whole truck was covered with skin having TB related messages. The artists were available during their travel to communicate with the general public and conveying TB related messages through artists by performing drama/stage.

The mobile theater started from Lahore in the second week of March 2016.



- **Rickshaw Branding** activity was carried out with the help of partners, 100 rickshaws for Lahore and 50 for each district managed to display TB messages related skins on rickshaws.
- **Cable Messages** During activities by the mobile theater, a cable message was also managed for announcing the time and venue of the activity along with the health facility available in nearby areas for TB care, diagnose and treatment.

### 4. Sindh

- World TB day seminars were held in different cities of the province chaired by Secretary health Sindh, PTP manager and other prominent officials for awareness raising and advocacy at different levels
- Walks were organized in different parts of the province including Jacoababad, Kandhkot, Larkana, Tharparker etc.
- Partners of PTP including Indus hospital conducted different activities to highlight the importance of diagnosing and treatment of TB, all the staff of Indus Hospital was given a one day orientation on TB care and control
- Green star another partner of PTP held a seminar, organized a walk and conducted a free medical camp which was attended by more than 100 people.



### A. Partners' Achievements

### 1. MERCY CORPS

### Major Achievement in PPM

### A. Background

Mercy Corps (MC) is the principal recipient for the New Funding Model (NFM) from the Global Fund and is implementing Public-Private Mix (PPM) interventions in 75 districts of the country since 1<sup>st</sup> July 2016.

MC has been implementing PPM interventions in selected districts through implementing partners. We had built partnership with over 2,000 private healthcare providers (in addition to around 280 private laboratories) who are providing quality DOTS services in the 75 districts. The project is being implemented satisfactorily in the target districts and is a great source of valuable information and lessons learnt in addition to enhanced case detection.

### **B.** Program Activities

The main program activities under NFM are:

- · Mapping and training of private healthcare providers and lab technicians on national TB DOTS guidelines
- · Community gatherings and engagement of Community Notables for better coordination and enhanced case detection.
- · Chest camps strategy for outreach
- Engagement of private labs in External Quality Assurance (EQA)
- · Quarterly review meetings for data validation with participation of project staff and PTP district representatives
- Quarterly PR-SR coordination meetings with active participation from all the implementing partners and other key stakeholders namely National Tuberculosis Control Program (NTP) and Provincial Tuberculosis Control Programs (PTPs).
- · Regular coordination between NTP and partners during inter-district and inter-provincial meetings
- ·

### C. Program Achievements

A total of 43,848 all type TB cases and 14,344 new sputum smear positive cases were diagnosed from July 2015 till December 2016, with a treatment success rate of 93%. Around 1,357 new doctors have been trained on TB DOTS through PPM initiative during the reporting period.

For active case detection, MC has been conducting chest camps in the 75 program districts. A total of 605 chest camps have been organized from July 2015 to December 2016 with a yield of 1,303 all form TB cases.

An additional component of Enhanced Case finding (ECF) has also been started from July 2016 under NFM grant in six districts of Punjab. Under ECF, following are the main interventions:

- 1. Identifying and treating TB in large private hospitals; under this intervention mapping and selection of 2-3 large private hospitals were done in each intervention district. One selected hospital in each district is equipped with GeneXpert machine and Fluorescent microscope for rapid case detection and for identification of drug resistance TB (DR-TB) cases. Doctors and paramedics working in these hospitals are trained on National Guidelines on Tuberculosis. Also two screeners are placed in OPD in each hospital to actively identify the presumptive TB cases among the patients visiting OPD.
- Active case finding through mobile-screening vans; three mobile screening vans equipped with digital Xrays and fluorescent microscopy were procured and are used to conduct chest camps in six districts of ECF. A community gathering activity is done before the organization of chest camp to mobilize the



communities and raise awareness of general public regarding Tuberculosis and to ensure maximum participation in the chest camp.

In terms of technical and operational achievements of PPM, MC with technical support from NTP has conducted training of master trainers on TB DOTS on revised training methodology. The revised training methodology is different from conventional form of training as it is made more interactive by delivering presentations to the participants using multimedia. Also role plays, exercises and pre and post-tests are conducted during the training session to make it more productive. Through this training, SR staff has been trained as master trainers. These master trainers are in turn training General Physicians, paramedics and lab technicians working in PPM.

To commemorate World TB Day on 24<sup>th</sup> March 2016, MC has organized community gatherings, walks and seminars in 75 districts. The following activities are conducted during the month of March in relation to World TB Day 2016:

- Involving pharmacies in identification and referral of people with symptoms of TB
- Engagement of LHWs for house to house contact screening /referral of presumptive cases to chest camps
- Awareness campaign through 'tanga', 'chigchi' and 'donkey-carts
- Awareness on TB via text messages through mobile phones/ cellular companies

Mercy Corps with support from the National Reference Lab and NTP and PTPs, has ensured that all private laboratories working under the PPM initiative are brought under External Quality Assurance (EQA). A total of 319 labs are currently under EQA and out of these 303 (94%) performed adequately under EQA during the reporting period.



### 2. INDUS HOSPITAL

#### Introduction about GF - TB

The Indus Hospital – Indus Hospital Network (TIH-IHN), as a private sector PR, is contributing towards Objective 1 and 2 of the National Strategy to control TB in Pakistan.

Under the New Funding Model grant, The Indus Hospital is working in the private sector by expanding partnerships and engaging healthcare providers and managing the implementation of the grant together with public sector's Principal Recipient (PR), namely National TB Control Program (NTP). The Indus Hospital, being private sector's PR, is responsible for implementation of public-private mix interventions across the country.

The planned activities and strategies for TIH-IHN under the New Funding Model are set out below;

**The Zero TB initiative** calls for creating "islands of elimination" in geographically defined areas by following an evidence-based 'Search, Treat, and Prevent' approach which can be scaled up city-wide. Our program is designed based on this three-pronged approach and includes the following components:

**FAST:** An active screening program for adults under FAST program is implemented at 24 hospitals and surrounding catchment areas. Screening of TB Symptoms of over 1 Million people is made from Oct 2016 – May 2017. 21 GenXpert Machines have been installed for the testing of samples. Over 50,000 GenXpert tests have been provided Free of Cost. Together with this, 3 X-ray Mobile Vans are operating in rotational basis in different hospitals. Over 14000 X-rays have been taken since March 2017 for diagnosis and testing.

**Childhood TB Program** A comprehensive Childhood TB program to be implemented at 10 hospitals in Karachi which focuses on finding missing cases of Childhood TB, accurately diagnosing them, and supporting them through treatment. There are currently 10 active sites for childhood TB in which more than 1100 patients have been diagnosed of the disease.

AIC (Airborne Infection Control Program): An airborne infection control program that includes installation of ultraviolet germicidal irradiation lights in crowded OPDs across the city. Currently UVGI lights are being placed two OPDS of Karachi and many more are being installed.

**Co-morbid Conditions Program:** A comprehensive co-morbid conditions component that screens and manages Diabetes, COPD, and Depression/Anxiety along with counselling in TB patients. The program is currently implemented at 6 sites in Karachi.

**PET (Post Exposure Therapy):** A post exposure therapy program for contacts of TB patients are implemented in 6 selected locations to address TB infection which could progress to TB disease in future.

**Community Health Solutions** (CHS) Community Health Solutions operates as a social enterprise and has established centers across Pakistan where TB testing and treatment are provided free of cost. There are currently 33 active centers running under the brand name of Sehatmand Zindagi Centers together with and 7 active BMUs in Sindh and Punjab.

**Programmatic management of drug resistant TB:** PMDT (programmatic management of drug resistant TB) is working for the patients who are resistant to first line of drugs. There are currently 12 active PMDT sites in Sindh and Baluchistan.

### 2. Greenstar

PPM - Greenstar has achieved the milestone of detecting and treating more than 100,000 case with treatment success rate of 92%.

Greenstar has a history of working for TB Control in Pakistan since 2005 in collaboration with National & Provincial TB Control Programs, supported by The Global Fund. Greenstar has contributed more than 105,000 TB cases to the national case notification with treatment success rate of 92%. Greenstar is working with established network of 1500 private sector Health Care providers and 120 private laboratories. Key activities include community outreach,



chest camps, notable & community gathering meetings, mass media involvement, patient follow-up at doorstep, childhood intervention, pharmacy engagement and contact tracing following the PPM 1 model with Active Case Detection.

In the current year, Greenstar is working with National and Provincial programs and has posted anincrease of 89% in TB case detection i-e 18209 TB cases have been detected. During the year, 1896 healthcare providers have been trained (Basic & Refresher) on standard TB management protocols / lab diagnostics and 1,09,200 community members are being sensitized and benefitted through 3120 community engagement events including meetings and free chest camps. Greenstar has also launched innovative interventions of Childhood TB management in PPM with support of NTP and engagement of private pharmacies for referral of presumptives to trained health care providers. 2000 private pharmacies have been trained and involved in developing referral linkages with public and /or private TB care facilities.

GSM will continue its efforts for control of Tuberculosis in Pakistan under the umbrella of National and Provincial TB Control Programs, Government of Pakistan.







### G. Procurement and Supply Chain Management (PSCM) Unit - NTP

In-country procurements:

PSCM Unit at NTP ever since its establishment in year 2010 is performing its zealous services with utmost *transparency, competitiveness and uprightness*. The unit ensures the application of all rules/ policies envisaged in the procurement manual while processing any minor or major in-country procurement.

During the year 2016 PSCM Unit was able to process all the approved and planned procurement. 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 grant funds. The local procurements included (not limited to) *miscellaneous laboratory equipment, laboratory consumables, IT equipment and supplies, printing of miscellaneous program modules, infrastructure up-gradation of labs to BSL-II & III, up-gradation of infrastructure at PMDT sites, heavy-duty generators, 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.

International Procurements:

Alongside successful management of in-country procurements in the year 2016, 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.

PSCM Facilitation of Global Drug Facility (GDF) Missions:

The GDF missions from Geneva-Switzerland visited Pakistan twice during the year 2016. The first visit took place in January 2016 whereas, the second visit paid was in the month of November 2016. Purpose of these missions was to basically provide an oversight on the *ATT drugs quantifications, forecasts, risks & challenges in the management of ATT drugs* throughout the country. During their visit mission extensively visited major hospitals managing MDR-TB in the provinces of Punjab and Sindh, they paid thorough supervisory visits to provincial warehouses & witnessed sufficient availability of ATT drugs throughout the country. Mission also visited Drug Regulatory Authority Pakistan (DRAP) to acquire firsthand knowledge with regards to NOC solicitation ad issuance procedures which play vital role in ensuring un-interrupted and smooth provision of FREE OF COST ATT drugs to TB patients in every nook and corner of the country.

After the visit concluded, the mission team presented the mission findings and few recommendations for further improvements in the field of PSCM, to NTP senior management. PSCM Unit at NTP successfully implemented the suggestions & recommendations of mission and ensured right quantifications, revised supply chain applications etc. Performed ATT quantification's & reviews on GDF approved templates i.e. GDF excel quantifications sheets & Quan TB version-IV.

In addition to aforesaid successful GDF/ GF missions, PSCM Unit successfully managed and was successful in handling all the international backlog orders of SLD's from IDA.

New Paediatric ATT drugs regimen:

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 paediatrics TB treatment. This new regimen was duly approved by WHO in its guidelines of 2014. PSCM unit at NTP was able to secure necessary NOCs from in-country DRAP and smooth receipt of these imperative drugs in its warehouse was ensured timely. These new pediatrics ATT drugs regimen is



quite user friendly with acceptable fruit flavors in children & easily dispersible for better compliance.

PSCM Unit in close coordination with PPM Unit at NTP drafted advisory & shared with provinces about the basic required parameters on new pediatrics regimen after due approval from GF team. Trainings were planned, conducted & a way forward was planned & afterwards implemented the successful transition to new pediatrics ATT regimen.

### "Push" to "Pull" inventory management:

In year 2016 yet another successful intervention that made by PSCM Unit NTP was the development & implementation of an Excel based *TB-012 form* for the requisition of Second Line ATT Drugs which provided the basis to switch from "Push" to "Pull" mechanism for the ATT drugs management. Accordingly, with due emphasis and follow ups lead time from demand to supply to field offices all across the country was improved significantly.

### **NTP Central Warehouse:**

One of the recommendations of mission team was to judiciously utilize the space for proper stacking of inventories per Good Warehousing Practices. Since, warehousing is one of the key component of SCM and needed immediate attention to the recommendations made by the mission hence, the warehouse staff dedicatedly undertook the exercise and improved the stacking standard which now provides easy access not only to warehouse staff to follow FEFO but to the monitoring teams to easily find the complete picture of inventories stacked per their product names and provide assurance for managing inventories with globally accepted and followed mechanism of FEFO to avoid any expiries / wastage of program commodities.

### Shortage of ATT Drugs in Private sector in Pakistan:

Since, quite a portion of ATT drugs is manufactured locally which is basic source of addressing the major chunk of availability of ATT drugs to TB patients in the country. Unfortunately, from the very advent of year 2016, a serious problem popped-up and TB patients across the country were left with no option but to face non-availability of ATT drugs in private sector because of some administrative issues between local manufacturers and GoP. The issue got worsened by the mid of 2016 where Drugs Sensitive (DS) TB patients relying on locally manufactured ATT drugs were left with no option but to leave hope of their survivals. In this course, MoNHSR&C asked NTP's senior management for immediate support to avoid any expected shortage of ATT drugs in the country. NTP PSCM Unit led from the front and after analyzing the ATT drug stocks not only gave assurance to GoP but, also ensured the regular supplies of drugs all across the country.

### 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.



### H. Global Fund Grant Management

The Global Fund is supporting Pakistan for prevention and control of TB since 2004. Global Fund support is critical to continue diagnosis and treatment of thousands of patients suffering from TB, Malaria and AIDS in Pakistan. 360,360 Drug Sensitive TB Cases were detected and treated and 2,881 MDR-TB cases were registered for treatment in year 2016 through the GF support.

GLOBAL FUND SINGLE STREAM OF FUNDING (SSF) GRANT EXTENSION & NFM



### **Current Grant:**

The Grant titled "Contribute towards achieving the targets of National Strategic Plan for reducing the burden of TB and MDR-TB in Pakistan" is being implemented by NTP as public sector Principal Recipient (PR) for all of the 146 districts and territories across the country through its implementing partners, both public and private, as Sub-Recipients (SRs), 4 Provincial and 4 Regional TB Control Programs.

Public Sector SRs	(1) Provincial TB Control Program Baluchistan
	(2) Provincial TB Control Program Khyber Pakhtunkhwa
	(3) Provincial TB Control Program Punjab
	(4) Provincial TB Control Program Sindh
Private Sector SRs	Association for Community Development (ACD)
	Association for Social Development (ASD) and
	Greenstar Social Marketing (GSM)



The SSF grant ended in June 2015, and NFM grant was awarded by GF for a period of two and a half years i.e. from Jul 2015 to Dec 2017. However, due to delays in Framework Agreement signing between Govt. of Pakistan and The Global Fund, NTP was granted one-year extension from Jul 2015 to Jun 2016. The Framework Agreement was signed in February 2016 and consequently the NFM grant was signed for the period of one and a half year i.e. from Jul 2016 to Dec 2017.

NTP has an established mechanism to review the SRs' progress and disburses funds on quarterly basis to ensure smooth functioning of grant all over the country without any interruption. PTP SRs have been provided with adequate HR support at two levels; one for program management like program management, M&E, finance etc. and other, clinical support for which HR is provided for implementing hospitals and labs in each province/region. Trainings, Communication Material, Monitoring & Evaluation and other operational costs for Planning & Administration are also provided. Above all, at least half of first line and all second line anti-TB drugs to address the demand gap of the provinces/ regions along with diagnostic equipment like X-ray machines, Gene Xpert machines, microscopes, power generators & UPS etc. are also provided to the SRs. Its maintenance and running costs including cartridges, lab reagents etc. are also provided through GF grant support.

In post-devolution scenario NTP has a role of developing national policies and guidelines, monitoring, and reporting of the programmatic and financial achievements to The Global Fund and LFA and all other international agencies/ partners as required. Additionally, NTP taps international funding to plug the resource gap in the country both at technical and financial levels. It is also pertinent to mention that NTP plays a role of coordinating body rather than implementing agency. The outward coordination is made internationally with donors and partners and, inward coordination is made with Provincial / Regional TB Programs and other in-country players involved in TB control activities. NTP is continuing its supervisory and technical support role with no implementation except for federal administrative territories (AJK, GB, FATA and ICT), and support/ facilitate the provinces for international procurements and liaison with international partners for resource mobilization etc.

Mercy Corps and The Indus Hospital are also implementing Public Private Mix (PPM) component of this grant, in the capacity of Co-Principal Recipients from private sector.

### **Goals and Objectives**

Goal	80 To end the TB epidemic in Pakistan
	<ul> <li>Objective-1 (Sensitive TB): To increase the number of notified TB cases (all forms) from 64% in 2015 to at least 90% by 2020</li> </ul>
Objectives	Objective-2 (DR -TB): To increase notification of MDR from 24% to 80% of the estimated incident pulmonary TB and cases by 2020
	80 <b>Objective-3:</b> Maintain the treatment success rate at 91%, and the MDR TB success rate from 72% in 2015 to 75% by 2020

Through GF grant support all functional levels of laboratory network are being enhanced in terms of staff trainings, infrastructure development, laboratory equipment, lab supplies and activities have been scaled up for nationwide External Quality Assurance (EQA) of sputum smear microscopy. 16 Labs are being up-graded at Bio-safety Level 2 (BSL-2) to perform Culture, while, 6 labs are being up-graded at BSL-3 to perform Culture and Drug Susceptibility Testing (DST) for diagnosis and follow up of MDR-TB cases. To date 13 BSL-2 Labs and 4 BSL-3 Labs have been up graded.



55 tertiary care hospitals and 146 DHQ Hospitals all over Pakistan have been enabled to provide DOTS care as per national guidelines, to routine TB patients, and management of childhood TB. Through re-programming 155 Screeners have been provided in all TCHs and DHQs for more focused and intensified TB case finding within different hospital units. This HR was not part of the original grant proposal.

TB/HIV Co-infection is focused in the grant support. Collaborative planning and monitoring of interventions for TB-HIV co-infected patients have been established at 40 sentinel sites all across the country and WHO technical guidelines for screening, counseling, diagnosis, treatment and support of patients co-infected with TB-HIV have been adapted in the country context. 24 new sentinel sites were established during the year 2016.

MDR-TB patients are being managed through 30 hospitals all across the country. 29 hospitals have been up-graded to ensure appropriate infections control measures in place, while six more PMDT sites are to be established and process has been initiated. Currently, registration and treatment of MDR-TB patients is underway at 29 designated hospitals.

Drug Management is an essential component of the grant and all the first and second line quality assured anti-TB drugs are being procured through international vendors. The drug storage and distribution system at national, provincial and district levels has already been improved through refurbishment of warehouses by providing a standard package and providing customized loader vehicles for transportation of drugs.

Human resource is the most precious asset of an organization. Dedicated staff is available to implement the grant activities at various levels. The program addresses human resource development to strengthen the programs for effective management of the project and TB control activities.

### **Resource allocation:**

The New Funding Model (NFM) grant was approved with total budget of USD 140 million for TB in Pakistan for the period Jul 2015 to Dec 2017. NTP has been granted USD 81.6 million for a period of one and a half year from Jul 2016 to Dec 2017.

The resources in terms of finances as well as commodities / products are distributed through the implementing partners. Significant amount of the budget (around 80%) has been allocated for anti-TB drugs both first and second line, up-gradation/ equipment and social/ food support, which are being managed by the PR as per GF Guidelines.

#### Major Achievements:

- Framework Agreement has been signed between The Global Fund and the Govt. of Pakistan
- NFM grant for the period Jul-16 to Dec-17, signed between The Global Fund and NTP
- National M&E Plan drafted and finalized based on MESST exercise conducted in Nov-16
- NTP re-programmed its savings for procurement of 259 GeneXperts and 55 CAD-4-TB X-Ray machines to improve diagnosis of TB cases and provide easy access to quality diagnostics for TB patients
- Re-structuring of NTP GF grant supported was done for optimal use of HR
- Scaling up of MDR-TB intervention is underway through Global Fund grant enabling six more hospitals
- Currently 29 out of 30 existing PMDT sites are managing MDR-TB patients
- Out of total 22 Labs, 18 have been upgraded at Bio-safety Level 2 & 3 to perform TB Culture and Drug Susceptibility Testing and remaining four labs are at different levels of up gradation
- NTP has signed a MoU with Armed Forces of Pakistan as part of para-statal health network for standardized treatment of TB through its chain of hospitals
- MH Rawalpindi has started reporting both DS and DR-TB cases; negotiations are in process to induct more



hospitals from army, air force and navy

- Doctors, paramedics and program management staff have been trained on programmatic management of MDR-TB, laboratory services, childhood TB management and basic DOTS management; following number of health care providers has been trained:
  - 735 Doctors (06 days) and Managers (02 days) have been trained on Basic Core DOTS
  - 329 Paramedics (03 days) trained on Basic Core DOTS
  - 201 Doctors (02 days) are trained on Childhood TB Management
  - 192 Paramedics (02 days) has received training on Childhood TB Management
  - 150 Lab. Technicians (02 days) are also trained on Childhood TB Management
- Social support was introduced in the form of food basket & compensation for travel expenses. However, on the basis of lessons learnt it has been replaced by a mobile-phone based cash transfer mechanism which will be continued to ensure treatment adherence and increase treatment success
- For management of TB-HIV co-morbidity the number of Sentinel Sites has been increased from 16 to 40 based on disease prevalence in consultation with the PTPs and NACP
- Recording and reporting tools and systems have been updated keeping in view current requirements besides strengthening of monitoring and supervision in this critical area
- Enterprise Resource Management (ERP) system is being procured for the PR and its SRs, negotiations are in progress with the Global Fund

### Health system strengthening:

National Tuberculosis Control Program (NTP) is responsible for Policy Guidelines, Technical Support, Coordination, Monitoring & Evaluation and Research activities whereas the Provincial Tuberculosis Control Programs (PTPs) and Districts are responsible for the actual care delivery processes including program planning, training of care providers, case detection, case management, monitoring and supervision.

GFATM support addresses the key components of Stop TB Strategy. Interventions are contributing in Health System Strengthening which includes:

- Human resource capacity building for management of Tuberculosis of project as well as public sector health staff
- Provision of essential Human Resource for drug resistant TB care, BSL-2 & 3 laboratories network and technical staff for grant management both at PR and SR levels including Program, Finance and PSCM staff
- · Up-gradation of DR-TB treatment sites and introduction of infection control measures
- · Introduction and expansion of new diagnostic tools
- · Establishment of bio-safety TB laboratory in public sector
- · Strengthening referral linkages between different tiers of health care services



<b>PERFORMANCE -</b>	- YEAR 2016
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	Indicator	Description	Targets	Results	%
	DOTS-1a	Number of notified cases of all forms of TB - bacteriologically confirmed plus clinically diagnosed, new and relapses	359,442	360,360	100%
	DOTS-1b	Number of notified cases of bacteriologically confirmed TB, new and relapses	164,862	139,079	84%
<b>FB Care and Prevention</b>	DOTS-2a	Percentage of TB cases, all forms, bacteriologically confirmed plus clinically diagnosed, successfully treated (cured plus treatment completed)	274,475         301,652           (91%)         (100%)		110%
	DOTS-2b	Percentage of bacteriologically confirmed TB cases successfully treated (cured plus completed treatment)	119,944 (91%)	122,598 (93%)	102%
Module-1:	DOTS-3	Percentage of laboratories showing adequate performance in external quality assurance for smear microscopy	997 (80%)	950 (76%)	95%
	DOTS-4	Percentage of reporting units reporting no stock- out of first-line anti-TB drugs on the last day of the quarter	1,113 (90%)	1,230 (99%)	111%
	DOTS-7a	Number of notified TB cases (all forms) contributed by non-NTP providers- private/non- governmental facilities	53,750	98,167	183%

	Indicator	Description	Targets	Results	%
Module-2: MDR-TB	MDR TB- 1a	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	19,860 (11%)	17,667 (10%)	89%
	MDR TB-2	Number of bacteriologically confirmed, drug resistant TB cases (RR-TB and/or MDR-TB) notified	3,849	3,274	85%
	MDR TB-3	No. of cases with drug resistant TB (RR-TB and/or MDR-TB) that began second-line treatment	3,849	2,824	73%
	MDR TB-5	Percentage of DST laboratories showing adequate performance on External Quality Assurance	5 (71%)	5 (71%)	100%



	Indicator	Description	Targets	Results	%
lle-3 HIV	TR/HIV-1	Percentage of TB patients who had an HIV test	23,513	13,120	56%
Modu TB/ŀ	10/1110-1	result recorded in the TB register	(7%)	(4%)	3070

	Indicator	Description	Targets	Results	%
ц	M&E-2	Proportion of facility reports received over the	1,670	1,282	77%
le-5 ealth ation nd M8	5	reports expected during the reporting period	(90%)	(69%)	
lodu S - H orm:		Percentage of HMIS or other routine reporting	1,670	1,282	
Mc HSS infc system	M&E-1	units submitting timely reports according to national guidelines	(90%)	(69%)	77%

### Future Plan:

NTP will continue all its current activities and in addition will be undertaking following major tasks:

- Development of National Strategic Plan year 2018-2020 in light of End TB Strategy.
- This National Strategic Plan will be used to develop Concept Note for Global Fund New Funding Request for the period 2018-20 to be submitted in May 2017
- A new initiative of Common PC-1 to manage Global Fund Grants for AIDS, TB and Malaria has been taken by the ministry in collaboration with other disease programs. Once approved, it will extract efficiencies and enhance coordination among all three disease program



### **PICTURE GALLERY**



Six participants were thoroughly trained on intensive research process and paper writing in three modules and successfully completed the course and among them 4 have already published their paper in international scientific journals, one is accepted for publication and one is under review process.



National inventory study to measure TB under-reporting in children in 12 selected districts in Pakistan.



Childhood TOT 8-9<sup>™</sup> December 2017 in Islamabad.



NTP presentation on Childhood TB notification during 23<sup>rd</sup> Bieannual Pediatric conference in Islamabad 11-13 November 2016.



STAG & PPA meeting to revise and update PPA scoring chart 1-2 December 2017, in Islamabad



Chest Camp – A direct Community intervention by Greenstar



A TB patient under treatment with Greenstar at Chak 115, Tibba, Rahim Yar Khan



Community Gathering at Bhatta village, Gujjar Khan, Rawalpindi – Direct community Interaction at World TB Day



A Patient verification visit at his doorstep – District Bahawalpur



TB infection control training workshop at PMDT Larkana



Handing over of PMDT Loralai to stakeholders



MDR WARD UPGRADED AT PMDT MILITARY HOSPITAL







CULTURE ROOM AT JPMC BSL 2 LAB



HANDING OVER OF PMDT AT AIMS MUZZAFFARABAD



























### ANNEXURES

### Annex (MDR) -1:

Table : List of PMDT treatment sites

S.#	Name of PMDT Site	Province/Region	Implementing PR/SRs
1	OICD, Hospital Karachi	Sindh	PTP-Sindh
2	Indus Hospital Karachi	Sindh	IHK-SR
3	ICD, Kotri	Sindh	IHK-SR
4	JPMC, Kotri	Sindh	IHK-SR
5	GMMCH, Sukkur	Sindh	IHK-SR
6	DHQ, Hospital, Mirpurkhas	Sindh	IHK-SR
7	CMC, Hospital, Larkana	Sindh	IHK-SR
8	PMC, Hospital, Nawabshah	Sindh	IHK-SR
9	FJCH, Quetta	Baluchistan	IHK-SR
10	DHQ, Hospital, Loralai	Baluchistan	IHK-SR
11	Gulab Devi Hospital, Lahore	Punjab	PTP-Punjab
12	Mayo Hospital, Lahore	Punjab	ASD-SR
13	Jinnah Hospital, Lahore	Punjab	ASD-SR
14	Leprosy Hospital Rawalpindi	Punjab	ASD-SR
15	Nishtar Hospital Multan	Punjab	ASD-SR
16	BVH, Bahawalpur	Punjab	ASD-SR
17	SZH, Rahim Yar Khan	Punjab	ASD-SR
18	DHQ, Hospital, Faisalabad	Punjab	ASD-SR
19	DHQ, Hospital, Sargodha	Punjab	ASD-SR
20	DHQ, Hospital, Sialkot	Punjab	ASD-SR
21	Samli Hospital Murree	Punjab	ASD-SR
22	PIMS, Hospital Islamabad	Federal/ICT	ASD-SR
23	AIMS, Hospital, Muzaffarabad	АЈК	ASD-SR
24	MH, Hospital, Rawalpindi	NTP	NTP
25	LRH, Peshawar	КРК	ACD-SR
26	ATH, Abbottabad	КРК	ACD-SR
27	MMMTH, DIK	КРК	ACD-SR
28	SSTH, Swat	КРК	ACD-SR
29	DHQ, Hospital, Gilgit	GB	ACD-SR



Annex (MDR) -2:
Table : Enrollment of DRTB patients by PMDT treatment sites

Year	Province	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDH	Punjab			54	71	108	173	141	153	134
MHL	Punjab					14	109	118	127	126
JHL	Punjab						19	82	75	128
RLH	Punjab			4	33	54	102	114	126	125
SSM	Punjab				1	17	73	80	63	75
МН	Punjab								6	30
NHM	Punjab					21	89	223	161	155
BVH	Punjab						2	34	69	96
SZH	Punjab							50	65	66
SARG	Punjab						3	91	97	119
SKT	Punjab						1	11	72	76
FSD	Punjab							2	39	98
Punjab	SubTotal			58	105	214	571	946	1053	1228
OICD	Sindh			53	204	228	241	186	120	153
ІНК	Sindh	1	25	98	114	165	151	164	138	157
JPMC	Sindh						13	57	88	72
DMC	Sindh									5
ICD	Sindh					63	222	386	239	268
RCH	Sindh									1
РМС	Sindh							45	139	152
GMMCH	Sindh					1	79	184	166	186
СМС	Sindh						10	85	87	111
THR	Sindh									
МРК	Sindh						10	128	188	157
Sindh	SubTotal	1	25	151	318	457	726	1235	1165	1262
LRH	КР				76	178	167	213	178	139
ATH	КР						40	50	65	44
MMMTH	КР						9	42	33	47
STH	КР							22	24	25



### Annex MDR-3:

Table : Treatment of DRTB enrolled on SLD by province

		DRTB Pt. enrolled	Cured	Complete	Died	Failed	Lost to Follow-	Not Evaluate	Still under Tx
							Up	d	
2008	Total	1	1						
	Sindh	1	1						
2009	Total	25	24	1					
	Sindh	25	24	1					
2010	Total	209	145	6	31	7	18	2	
			69%	3%	15%	3%	9%	1%	0%
	Punjab	58	41	1	14	1	1		
			71%	2%	24%	2%	2%	0%	0%
	Sindh	151	104	5	17	6	17	2	
			69%	3%	11%	4%	11%	1%	0%
2011	Total	499	360	22	64	24	26	3	
			72%	4%	13%	5%	5%	1%	0%
	Puniab	105	80	2	20	3	0,0	270	0,0
	T unjub	105	76%	2%	19%	3%	0%	0%	0%
	Sindh	318	220	17	39	13	26	3	070
	Shan	510	69%	5%	12%	4%	8%	1%	0%
	K-D	76	60	3	5	<del>,</del>	070	170	070
	N-F	70	70%	1%	7%	11%	0%	0%	0%
2012	Total	001	622	20	121	11/0	29	22	070
2012	TOLAI	004	023	33	121	40	38	23	00/
			70%	4%	14%	5%	4%	3%	0%
	Punjab	214	150	3	45	9	6	1	
			70%	1%	21%	4%	3%	0%	0%
	Sindh	457	303	35	49	19	31	20	
			66%	8%	11%	4%	7%	4%	0%
	K-P	178	146	1	18	12	1		
			82%	1%	10%	7%	1%	0%	0%
	Balochistan	35	24		9			2	
			69%	0%	26%	0%	0%	6%	0%
2013	Total	1563	1067	31	283	65	85	29	3
			68%	2%	18%	4%	5%	2%	0%
	Punjab	571	377	12	116	22	29	12	3
			66%	2%	20%	4%	5%	2%	1%
	Sindh	726	501	15	113	31	51	15	
			69%	2%	16%	4%	7%	2%	0%
	K-P	216	156	3	46	10	1		
			72%	1%	21%	5%	0%	0%	0%
	Balochistan	43	28		7	2	4	2	
			65%	0%	16%	5%	9%	5%	0%
	ICT	7	5	1	1				
			71%	14%	14%	0%	0%	0%	0%
2014	Total	2642	1652	49	486	94	260	93	8
			63%	2%	18%	4%	10%	4%	0%
	Punjab	946	555	29	207	23	91	37	4
			59%	3%	22%	2%	10%	4%	0%
	Sindh	1235	770	16	196	60	155	35	3
			62%	1%	16%	5%	13%	3%	0%
	K-P	327	245	4	52	8	3	14	1
			75%	1%	16%	2%	1%	4%	0%
	Balochistan	83	51		19		8	5	
		-	61%	0%	23%	0%	10%	6%	0%
	ICT	51	31		12	3	3	2	
			61%	0%	24%	6%	6%	4%	0%



### Annexes (NRL)-1

Table :Microscopy: EQA coverage and performance of centers

		Punjab	Sindh	KP	B.TAN	AJK	GB	FATA	ICT	Total
	2005	445	237	163	63	35	11	28		982
Microscopy Network	2006	445	237	181	80	35	18	28		1026
	2007	472	259	199	102	57	18	24		1131
EQA coverage	2008	473	262	203	102	62	22	24		1148
	2009	473	264	199	108	67	22	26		1159
ž	2010	486	270	202	108	67	22	26		1181
etwo	2011	487	274	203	108	67	22	26		1187
Microscopy Network	2012	494	274	204	107	52	22	17	7	1177
cob	2012(PPM-GF)	103	56	29	11	2	0	0	3	204
cros	2013	497	267	204	111	52	22	23	7	1183
Ž	2013 (PPM-GF)	113	57	30	6	5	0	0	2	213
	2014	511	271	204	111	54	22	29	7	1209
	2014 (PPM-GF)	148	55	47	8	7	7	0	2	274
	2015	536	279	215	94	54	22	24	8	1232
	2015 (PPM-GF)	153	60	71	3	4	6	0	3	300
	2016	539	279	215	94	56	22	26	8	1239
	2016(PPM-GF)	174	82	77	3	12	4	0	6	358
	2006	111	84	/1	29	18	11	0		324
	2007	118	91	81	40	18	12	0		360
	2008	420	254	200	57	15	2	14		940 1005
	2009	441	202	191	91	0	0	20		1005
	2010	482	268	200	93	48	0	15		1106
	2011	480	268	199	98	53	0	14		1112
60	2012	491	270	201	60	53	0	1/	3	1095
/era	2012 (PPM-GF)	33	45	5	0	1	0	0	0	84
CO	2013	493	267	204	91	52	0	18	7	1132
EQA	2013 (PPM-GF)	113	57	30	6	5	0	0	2	213
	2014	509	269	203	90	54	0	27	6	1158
	2014 (PPM-GF)	124	33	31	3	4	6	0	2	203
	2015	506	261	200	93	54	0	23	7	1144
	2015 (PPM-GF)	121	43	56	2	3	4	0	2	231
	2016	493	216	187	89	56	NA	26	7	1074
	2016(PPM-GF)	132	44	63	3	2	4	0	2	260
	2006	20	15	31	22	2	5	0		95
	2007	42	61	49	21	4	11	0		188
	2008	257	125	124	43	7	2	12		570
	2009	282	138	127	75	0	0	18		640
는 분	2010	319	149	149	85	34	0	13		749
s wit	2011	361	167	133	89	25	NA	13		788
ble	2012	368	165	132	48	38	ΝΔ	17	З	771
Cen	2012 (PDM GE)	200	36	132	NIA	1	NA	1, NIV	NIA	60
# of acce	2012 (FFIVI-OF)	20	140	4		1		11		03
+= (0	2013	395	142	151	/3	43	NA NA	12	4	019
	2013(PPIM-GF)	106	25	27	6	5	NA	NA	2	1/1
	2014	422	158	157	87	47	0	17	2	890
	2014(PPM-GF)	110	26	28	2	4	6	0	2	178
	2015	415	186	155	90	49	0	11	4	910
	2015 (PPM-GF)	113	34	56	2	3	4	0	2	214



				atory per	normance	Indicators			107	
Positivity		Punjab	Sindh	KP	B.lan	AJK	GB	FAIA	ICI	Nationa
Rate among	2006	13.5	18.9	18.1	16.7	17.1	7.7	17.8		16.6
	2007	14.5	18.9	18.6	13.3	19.9	8.8	15.4		16.2
TD Cases	2008	15.3	20.2	18.9	16.0	21.5	8.1	18.0		16.8
	2009	14.6	21.9	18.0	18.7	21.9	NA	31.4		16.7
	2010	15.3	20.3	20.2	18.7	17.7	NA	22.9		16.9
	2011	14.2	18.1	18.9	16.6	14.8	NA	17.5		15.6
	2012	13.7	17.6	18.3	15.90	12.4	NA	19.3	7.2	15.0
	2012 (PPM-GF)	12.9	19.2	35.9	NA	2.8	NA	NA	NA	18.9
	2013	13.4	16.8	18.5	15.3	12.3	NA	17.4	10.1	14.6
	2013(PPM-GF)	17.7	19.9	23.0	26.0	8.1	NA	NA	NA	18.7
	2014	13.6	16.5	16.4	13.7	12.1	NA	15.4	7.8	14.4
	2014(PPM-GF)	14.1	16.8	21.4	16.3	9.2	4.9	NA	2.6	15.0
	2015	13.2	15.1	14.9	12.8	11.2	NA	17.4	9.5	13.7
	2015(PPM-GF)	14.9	10.4	15.2	14.8	12.1	4.8	NA	3.5	13.3
	2016	12.7	14.3	14.8	13.5	10.2	15.5	NA	8.6	13.3
	2016 (PPM)	17.7	11.7	10.5	6	8.5	0.0	NA	6	15
Positivity	2006	0.9	3.7	2.6	1.7	0.8	3.3	0.7		2.4
Rate in	2007	2.8	4.6	2.3	1.8	0.7	2.1	2.1		3.2
Follow up	2008	1.4	5.6	3.3	1.7	1.1	1.7	4.4		2.7
examination	2009	1.7	6.0	3.6	1.5	1.4	NA	5.9		3.0
	2010	2.2	5.8	3.6	1.7	1.6	NA	4.3		3.2
	2011	2.6	5.3	3.9	1.9	2.5	NA	6.3		3.4
	2012	2.4	5.1	4.4	1.6	1.9	NA	6.1	1.4	3.3
	2012 (PPM-GF)	2.0	2.2	3.1	NA	50	NA	NA	NA	2.3
	2013	2.9	5.4	4.1	2.2	2.1	NA	4.4	1.3	3.6
	2013 (PPM-GF)	1.6	3.1	1.9	0	0	NA	NA	NA	2.3
	2014	3.2	6.3	4.0	3.7	1.9	NA	4.0	3.6	4.0
	2014 (PPM-GF)	2.6	3.1	3.7	0.0	0.7	5.9	NA	12.5	2.8
	2015	3.3	6.2	4.0	0.6	2.3	NA	6.3	16.3	3.9
	2015 (PPM-GF)	1.8	3.2	2.8	3.5	14.3	0	NA	0	1.8
	2016	3.5	6.4	4.8	3.7	5.9	6.2	NA	19.4	
	2016(PPM)	2.8	4.9	2.1	2.3	0	0	NA	0	
Proportion	2006	9.0	10.4	7.8	2.1	7.8	8.6	0		8.7
false	2007	6.5	6.5	2.4	7.3	6.9	9.5	0		5.6
positive	2008	4.4	4.6	3.1	2.0	8.8	0	2.2		4.1
	2009	2.5	5.5	3.2	1.8	NA	NA	0.0		3.3
	2010	2.0	3.7	2.9	1.1	4.7	NA	0.60		2.6
	2011	1.5	1.8	3.8	2.4	6.2	NA	0		2.2
	2012	1.7	2.9	2.8	3.5	3.8	NA	0.5	0	2.4
	2012 (PPM-GF)	5.9	16.5	2.8	NA	0.0	NA	NA	NA	11.8
	2013	1.5	3.3	2.9	4.1	2.1	NA	3.7	3.5	2.5
	2013(PPM-GF)	0.6	6.5	2.0	0.0	0.0	NA	NA	0.0	3.1
	2014	1.2	3.6	2.4	1.9	2.3	NA	4.1	4.2	2.3
	2014(PPM-GF)	1.6	4.7	1.2	0.0	4.8	0	NA	0.0	2.3
	2015	1.9	1.9	2.3	0.6	1.1	NA	2.6	9.5	1.9
	2015 (PPM-GF)	2.0	3.6	0.3	0	0	0	NA	0	1.9
	2016	1.2	2.8	1.3	1.9	2.1	NA	7.4	0	1.7

## Annex-(NRL) II:

. TD lak indicat Tabl



Proportion	2006	3.0	5.9	2.6	2.5	5.0	1.7	0.0		3.6
false	2007	2.2	3.2	1.5	3.1	6.1	1.3	0.0		2.3
Negative	2008	1.2	1.9	1.0	0.9	4.1	0	1.1		1.3
	2009	0.7	2.0	1.0	0.9	NA	NA	0.4		1.0
	2010	0.8	1.4	0.7	0.3	1.1	0	0.7		0.9
	2011	0.5	1.4	0.8	0.3	1	NA	0.5		0.8
	2012	0.5	1.1	0.8	0.6	0.2	NA	1.1	2.6	0.7
	2012 (PPM-GF)	0.4	1.3	1.6	NA	0.0	NA	NA	NA	1.0
	2013	0.6	1.6	0.6	0.9	0.1	NA	1.8	0.4	0.9
	2013 (PPM-GF)	0.3	2.9	0.2	0.0	0.0	NA	NA	0.0	1.4
	2014	0.6	0.9	0.6	0.2	0.2	NA	0.4	0.4	0.6
	2014 (PPM-GF)	0.4	1.4	0.5	0.3	0.0	0	NA	0.0	0.6
	2015	0.4	0.7	0.6	0.2	0.2	NA	1.5	6.4	0.5
	2015(PPM-GF)	0.4	0.6	0.0	0.0	0.0	0.0	NA	0.0	0.3
	2016	0.3	0.7	0.3	0	0.2	NA	0.3	0	0.4
	2016 (PPM-GF)	0.1	1.1	0.1	0	0.2	NA	NA	0	0.4
Efficiency	2006	95.4	91.4	95.2	96.9	93.5	97	0.0		94.5
of	2007	96.7	95.4	98	93.2	91.7	96.9	0.0		96.6
microscopy	2008	97.9	97.2	98.5	98.1	95	100	98.8		97.9
(agreement	2009	98.7	96.7	98.5	97.8	NA	NA	99.3		98.2
rate)	2010	98.8	97.7	97.8	99.3	96.9	NA	98.4		98.4
	2011	99.0	98.3	97.9	99.1	97.5	NA	98.7		98.6
	2012	98.9	98.1	98.3	98.8	98.7	NA	96.5	97.3	98.5
	2012 (PPM-GF)	97.1	92.2	98.0	NA	100	NA	NA	NA	95.0
	2013	99.0	97.8	98.7	98.1	99.3	NA	97.2	97.6	98.5
	2013 (PPM-GF)	99.0	95.9	98.2	99.3	99.2	NA	NA	100	97.7
	2014	98.8	98.3	98.9	98.9	98.6	NA	97.7	98.0	98.7
	2014 (PPM-GF)	99.1	97.8	98.9	99.3	93.4	100	NA	96.0	98.6
	2015	99.0	98.8	98.9	99.4	98.2	NA	97.2	92.6	98.8
	2015 (PPM-GF)	98.7	98.5	99.3	100	100	100	NA	100	99.6
	2016	98.2	98.4	99.4	98.4	98	99.7	97.8	99.6	98.5
	2016(PPM)									


## Annex-(NRL)-III:

GeneXpert performance from 2011 to 2015

S.#	Xpert Site	Total Tested						м	TB Detec	ted		Rif Resistance Detected					
		201 1	2012	2013	2014	2015	201 1	2012	2013	2014	2015	2011	2012	2013	2014	2015	
1	NRL	163	4645	4896	7083	10578	92	3161	2718	1978	2581	34	321	375	366	338	
Punja	ab																
1	SZH RYK	22	201	467	1013	1545	20	148	338	745	853	3	16	35	67	70	
2	NH Multan	109	689	640	2381	2188	37	272	263	897	1005	18	97	68	201	171	
3	BVH B.Pur				572	1180				124	327				26	45	
4	DHQ Sahiwal					100					55					12	
5	DHQ DG Khan					53					32					4	
6	Bahawal Nagar																
Sub	Total South Punjab	131	890	1107	3966	5066	57	420	601	1766	2272	21	113	103	294	302	
7	AH Faisalabad	28	391	585	1836	1648	8	120	136	291	469	0	19	27	46	71	
8	GDH Lahore	59	1160	928	2218	2236	48	810	712	1413	1569	27	289	230	310	301	
9	PMRC Lahore		13	257	801	1115		13	205	489	553		4	71	87	77	
10	JH Lahore	21	268	243	1080	993	15	112	126	356	300	7	13	23	55	35	
11	DHQ Sargodha				295	960				127	362				42	68	
12	DHQ Sialkot				71	893				22	361				6	54	
13	DHQ Gujranwala					41					13					6	
14	TB Sanitorium Samli					435					112					14	
15	PRL Lahore					28					15					2	
16	Mianwali																
Sub Total Upper Punjab		108	1832	2013	6301	8349	71	1055	1179	2698	3754	34	325	351	546	628	
Subtotal All Punjab		239	2722	3120	10267	13415	128	1475	1780	4464	6026	55	438	454	840	930	
Sindh																	
1	AHLO	295	3535	1077	2118	2780	186	2546	881	1264	1167	36	278	190	186	135	
2	ICD Kotri	94	717	790	1997	3170	84	578	697	1587	1710	32	200	273	397	236	
3	CMC Larkana	20	493	373	1247	1877	15	344	264	632	569	5	85	69	129	91	
4	GMMH Sukkur				618	1459				448	871				96	139	
5	CH Mirpur Khas				695	957				521	584				112	132	
6	LMUH Hyderabad				286	989				219	492				38	95	
7	PMCH Nawab Shah				230	923				182	484				54	121	
Sub total Sindh		409	4745	2240	7191	12155	285	3468	1842	4853	5877	73	563	532	1012	949	



Baluchistan																
1	FJH Quetta	7	415	174	551	1099	3	239	164	387	541	1	76	47	89	91
КР																
1	PRL KP Peshawar		956	975	1477	1457		416	327	562	390		56	53	72	44
2	LRH Peshawar	96	1379	726	870	1148	63	705	461	584	551	24	208	139	128	107
3	MMC Mardan			63	362	509			18	148	184			4	20	29
4	KTH Peshawar			425	501	448			139	171	155			12	15	17
5	ATH Abbotabad			226	724	907			117	294	275			33	43	38
6	DTO lab L. Dir			7	61	104			7	35	67			2	2	4
7	DTO Lab D. I. Khan			40	234	73			33	192	43			9	35	3
8	DTO Lab Batagram			4	81	110			2	65	82			0	5	11
9	DTO Lab Swat			29	305	474			19	139	170			5	24	17
10	DTO Lab Banu			2	182	477			1	162	337			0	17	28
Sub Total KP		96	2335	2497	4797	5707	63	1121	1124	2352	2254	24	264	257	361	298
FATA																
11	AHQ Bajour Agency			41	60	83			20	34	53			3	5	2
12	ATH Landi Kotal			9	110	135			8	43	69			0	1	2
13	AHQ Kurram Agency			19	64	237			7	24	85			0	2	1
14	AHQ Mohmand Agency				35	21				10	7				2	0
15	ATH South Waziristan				0	27				0	19				0	8
16	ATH Jamrud				0					0					0	
Sub Total FATA				69	269	503			35	111	233			3	10	13
AJK Muzaffarabad						461					138					7
DHQ Gilgit						22					7					0
Total NTP Sites		914	1486 2	1299 6	30158	43940	571	9464	7663	1414 5	1765 7	187	1662	1668	2678	2626
Sindh IRD				4030	26094	46695			810	4820	5175			96	341	345
Total Pakistan		914	1486 2	1702 6	56252	90635	571	9464	8473	1896 5	2283 2	187	1662	1764	3019	2971



## Annex-(NRL)IV:

Name referring Health facilities **Referring District** Province # of sample received **PMDT PIMS-Islamabad** ICT ICT 932 1 2 Mayo Hospital Lahore Lahore Punjab 164 3 Jinnah Hospital Lahore Lahore Punjab 83 377 4 Gulab Devi Hospital Lahore Lahore Punjab 5 DHQ Hospital Sargodha Sargodha Punjab 128 6 Rawalpindi Leprosy Hospital Rawalpindi Punjab 3234 7 Samli Sanatorium Murree Rawalpindi Punjab 2671 8 DHQ Hospital Sialkot Sialkot Punjab 83 9 DHQ Hospital Faisalabad Faisalabad 40 Punjab 10 **BVH** Bahawalpur Bahawalpur Punjab 92 107 11 Nishter Hospital Multan Multan Punjab 12 SZH Rahim Yar Khan Rahim Yar Khan Punjab 85 Fatima Jinnah Chest Hospital Quetta 10 13 Quetta Balochistan 14 AIMS AJK Muzaffarabad AJK 78 15 DHQ Hospital Gilgit Gilgit 01 **Gilgit-Baltistan** SUB-TOTAL NON PMDT 1 Federal General Hospital ICT ICT 1023 2 PIMS-Pulmonology ward-Islamabad ICT ICT 669 PIMS-Children ward-Islamabad ICT ICT 901 3 4 FGSH (Poly Clinic) Islamabad ICT ICT 512 5 CDA Hospital ICT ICT 61 6 ICT ICT 285 Nai Zindagi Trust 7 **RHC Bharakahu** ICT ICT 06 ICT 97 8 **KRL** Hospital ICT 9 Federal General TB Centre (FGTBC) Rawalpindi Punjab 331 10 Holy family hospital Rawalpindi Punjab 72 11 Benazir Bhutto Hospital Rawalpindi Punjab 352 12 DHQ Hospital Rawalpindi Rawalpindi Punjab 181 13 Khayaban-e-Sir Syed (KSS) Rawalpindi Punjab 657 14 Military Hospital Rawalpindi Rawalpindi Punjab 2191 15 **Combined Military Hospital** Rawalpindi <u>Punj</u>ab 174 Fauji Foundation Hospital Rawalpindi 1069 16 Punjab 17 Armed Forces Institute of Pathology Rawalpindi Punjab 39 (AFIP) 18 DHQ Hospital Jhelum Jhelum Punjab 68 55 19 DHQ Hospital Chakwal Chakwal Punjab 20 **DHQ Hospital Attock** Attock Punjab 18 21 PAF Hospital Rawalpindi Punjab 28 22 **Private Hospitals** ICT/Rawalpindi ICT/Punjab 388

NRL List of referring health facilities and work volume in 2016

## National TB Control Program

Ministry of National Health Services Regulations & Coordination Islamabad-Pakistan