National Tuberculosis Strategic Plan

2023-2027

GOVERNMENT OF PAPUA NEW GUINEA

MARCH 2023

Contents

List of figures

List of Tables

Abbreviations

ACF	Active case finding
aDSM	Active TB drug safety monitoring and management
ART	Anti-retroviral treatment
BMU	Basic Management Unit (for tuberculosis)
CBO	Community Based Organization
CF	Child Fund, an NGO
CPHL	Central Public Health Laboratory
CV	Community Volunteer
CTS	Community Treatment Supporter
DFAT	Department of Foreign Affairs and Trade
DRS	Drug resistance surveillance
DR-TB	Drug-resistant tuberculosis
DS-TB	Drug-susceptible tuberculosis
DST	Drug susceptibility testing
ECG	Electrocardiograph
EQA	External quality assurance
EHP	Eastern Highland Province
FBO	Faith Based Organization
FHI 360	Family Health International
GF	Global Fund
GLC	Green light committee
HCW	Health care worker
HEO	Health Extension Officer
HIS	Health Information System
HIV	Human immunodeficiency virus
HHISP	Health and HIV Implementation Services Provider
HSS	Health Systems Strengthening
LPA	Line probe assay (rapid molecular DST)
LIMS	Laboratory Information Management System
MDR-TB	Multidrug-resistant tuberculosis
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
NCD	National Capital District
NDoH	National Department of Health

NG Tube	Nasogastric Tube
NGO	Non-Governmental Organization
NHSS	National Health Service Standards
NRL	National Reference Laboratory
NTP	National Tuberculosis Programme
NTRL	National Tuberculosis Reference Laboratory
NSP	National Strategic Plan
OR	Operational Research
PHA	Provincial Health Authority
PLHIV	People Living with HIV
PMDT	Program Management of Drug Resistant TB
PMGH	Port Moresby General Hospital
PNG	Papua New Guinea
QA	Quality Assurance
QMRL	Queensland Mycobacterium Reference Laboratory
rGLC	Regional Green Light Committee
RR	Rifampicin Resistant
SL	Second-line
SMC	Smear Microscopy Centre
SRL	Supranational Reference Laboratory
TB	Tuberculosis
ToR	Terms of Reference
UPS	Uninterrupted power supply
WHO	World Health Organization
WHP	Western Highland Province
WNB	West New Britain (a province)
WV	World Vision
XDR-TB	Extensively Drug Resistant Tuberculosis
Xpert® MTB/RIF	Rapid Molecular Assay for TB/RIF

Executive Summary

Papua New Guinea (PNG) is a lower-middle-income country that has a high burden of TB, TB/HIV and MDR-TB. The treatment coverage is 68% (2021), the treatment success rate is 74% (2020 cohort). RR/MDR-TB cases are being reported from all the 22 provinces in PNG. Although more RR/MDR-TB cases were detected and enrolled in treatment in 2021, the provision of immediate access to effective second-line treatment, and proper care for RR/MDR-TB patients remains a major challenge. Childhood TB cases comprise about a quarter of the total cases and the recent joint external review reported suboptimal quality of diagnosis as one of the concerns. This is against the background of a weak health system grappling with staff shortages, late and incomplete reporting plus poor access to health services because of difficult terrain. There are seven levels of health facilities in the country and there is a plan for decentralization to the Provincial Health Authorities (PHAs). TB services are provided through 252 Basic Management Units, 123 microscopy centres only 95 of which were noted to be functional in the first quarter of 2019, and 64 GeneXpert sites performing Xpert® MTB/RIF test. TB diagnosis was noted to be mostly centralized and patients had to travel long distances or over long-time periods for TB services and this contributed to the high catastrophic costs.

***Main achievements of NTP up until 2022*:** Although in the period 2015-2022, the notification rate had flat lined and treatment success rate had remained below 70%, there were some successes for the program; 1) successful pilot of community-based TB treatment in the National Capital District and Daru that showed improvement in treatment outcomes, and quality of diagnosis with a decrease in patients whose sputum was not done or not available and increase in contact tracing and identification of presumptive cases; 2) expansion of GeneXpert network performing Xpert® MTB/RIF assays throughout the country to 64; 3). Daru TB project resulted in a high treatment success rate of 95% in MDR-TB patients; 5) funding was secured for a Childhood TB project aimed at improved diagnosis through training of doctors and improved treatment for children including those affected by RR/MDR-TB.

***Programmatic gaps identified in 2022*:** Three major gaps were identified; 1) persistent low treatment success rate due to low adherence to treatment (high number of cases that were not evaluated or were lost to follow-up); 2) weak diagnostic system (high number of patients whose sputum was not available or was not done). Some of the reasons identified for this were lack of sputum transportation system from the periphery to the diagnostic centres, poor quality assurance, decrease in the number of functioning microscopy centres, and lack of an intermediary lab at the provincial level to support the peripheral diagnostic centres; 3) organizational gaps. The planned decentralization of the health system to PHAs is slow and a need for strengthening the provincial level was emphasized by the joint external review.

Priorities for the National Strategic Plan (NSP) for TB 2023-2027: This third NSP 2023 - 2027 builds on the achievements and programmatic gaps of the NSP 2015-2020. The strategic objectives of the new plan are;

1. To provide universal drug susceptibility testing for all people with drug-susceptible and drug-resistant tuberculosis
2. To increase the treatment success rate for all forms of TB to at least 85%;
3. To strengthen TB/HIV collaborative activities; and
4. To strengthen the technical and managerial capacities of the National TB Program at all levels

The review process of this National Strategic Plan for TB 2023-2027 was consultative with the involvement of key stakeholders. It was highly participatory involving the introduction sessions and group works on situational analysis, SWOT and gap analysis and prioritization of identified gaps.

This NSP provides an overview of the priority interventions for PNG aligned to the End TB Strategy and new National Health Plan. It focuses on decreasing mortality and transmission of TB in the community. This will be achieved by optimising use of sensitive rapid diagnostic test; Xpert MTB/RIF, for bacteriological confirmation of all presumptive TB cases. Systematic screening of prioritised high-risk communities and contact tracing to ensure early diagnosis and prompt initiation of appropriate treatment for both active and TB. Ambulatory care for RR/MDR-TB will be scaled-up and strong efforts made to improve pharmacovigilance.

This plan intends to strengthen the PHAs to coordinate, facilitate the implementation of TB services, supervision and monitoring. They will be tasked to engage with civil society organizations, faith-based organizations, the private sector and communities to bring services closer to the patient. The NTP will also actively engage other government-line ministries and the private sectors through the establishment of a multi-sectoral accountability mechanism to address catastrophic costs due to TB.

This strategic plan recognizes and builds on the potential efficiencies through the strengthening of the health system including infrastructure, integrated monitoring and evaluation systems, drug procurement and supply chain management, and community volunteers' system. Appropriate national guidelines, SOPs, and algorithms will be developed, and health workers trained to facilitate early TB diagnosis and treatment in children and high-risk population including PLHIV and prisoners. Collaborative framework for action against TB and comorbidities such as HIV, Diabetes, and mental health will be established and implemented.

Overall technical and managerial capacities of the National Tuberculosis Program will be strengthened through capacity building, development of national guidelines in line with WHO's revised guidelines, the establishment of electronic data management system integrated into eNHIS, routine surveillance to determine the magnitude of TB including drug-resistant TB, monitoring and evaluation. The management of anti-TB drugs and supplies will be strengthened at all levels by reviewing and adopting appropriate policies, use of m-Supply and capacity building on supply chain management. Operational research will be strengthened by building the capacity of NTP staff to conduct research on TB. The findings of the operational research will be shared and published in various national, regional and international journals. The National Tuberculosis Program staff will also attend the annual medical symposium, international training and meetings.

The role and ownership for successful implementation of this NSP for TB 2023-2027 by the NTP and PHAs have been emphasized. This requires strong coordinated support of technical and implementing partners including donors.

Introduction and Background

Introduction

This is the fifth national tuberculosis strategic plan for tuberculosis of Papua New Guinea. The current strategy is informed by the Joint External Review of the TB program in 2019, rGLC mission in September 2022, the desk epidemiological review in January 2023, The World Bank Aide Memoire from a review in December 2018, report of the 2018 independent review of Australian government's investment in TB from 2011-18 in PNG and the Review of Child Project in 2018 (References). The national strategy plan for TB will be a guidance for the 22 PHAs to form their respective provincial TB strategic plan as per their geography, demography and health infrastructure.

This document is organized such that the core content is given upfront with the detailed supporting information in the appendices.

Overview of PNG

PNG is a lower middle-income country with estimated total population of 10 million (2021) and one of the 30 high burden countries for TB, TB/HIV and MDR-TB. Nearly 85% population lives in rural areas and 40% lives below the national poverty line. Please see Appendix 1 for a map and details. There are 22 provinces in the country. Population of National Capital District is estimated to be 420,000 (5% of the total population).

Structure of the health system

The "National Health Service Standards (NHSS) for Papua New Guinea" defines seven levels (1 to 7) of the PNG health service delivery model: aid post (level 1 or L1 facility), community health post/ Sub-health centres, health centres, district hospitals, provincial hospitals, regional hospitals and the national referral hospitals (L7) (Appendix 2). The NHSS sets out an essential package of health services to be delivered at each level, with minimum standards for health facility infrastructure, staffing needs, standard equipment lists and a health service accreditation programme.

There is an ongoing effort to decentralize the health system from the national level to the Provincial Health Authorities (PHA) of the 22 provinces in the country. The PHAs have their own budget supported through the provincial revenues and they are responsible for health service delivery, including implementation of the TB program.

PNG country profile

PNG is a LMIC country with GDP per capita of USD 2,673 in 2021. General government expenditure on health as percentage of total government expenditure was 9.5% and total expenditure on health was 4.3% of the GDP in 2014. Human Development Index was 0.5 (2017) and Gender Inequality Index was 0.741 (2017). The proportion of population with undernourishment is 21.6% (2021, WHO NLiS) with almost half of children under 5 years of age with stunting and a third of non-pregnant women and 44% of pregnant women having anaemia. Among children under-5, 28% are underweight and 50% are stunted[1].

The provinces with the highest levels of early childhood mortality also have low levels of immunization coverage. Difficult terrain and a lack of road infrastructure and transport contribute to the high cost of delivering services, and hinder patient referrals and supervisory visits[2].

Organization of the National TB Program

The Basic Management Unit (BMU) is the most peripheral level for TB prevention and care activities. The BMUs are situated within health facilities, including hospitals, health centres, and community health posts but mostly function as stand-alone facilities for TB services. BMUs have at least one health staff (often a community health worker or a health extension officer specifically assigned to carry out TB activities. The BMUs could have one to three staff for diagnosis and care. In the small BMUs the same person does lab work, provides treatment and keeps records. The BMUs could be supported by health sub-centres or Aid posts for distribution of TB drugs. The BMUs are also the basic reporting units – they submit their reports to the provinces from where these are sent to the NTP.

In most health centres and sub-centres that are not BMUs, no health staff is identified for TB activities. There is no position of TB coordinator at the district level.

At the provincial level, some provinces have government staff working as dedicated TB Coordinators. Nineteen of 22 provinces (excluding WP, NCD and Gulf) have Global Fund (GF) supported TB/HIV coordinators. They are the focal persons for TB in the province and report to the Provincial Disease Control Officer who reports to the Deputy Director Disease Control (Appendix 3).

Organization of the TB laboratory network

Of the 252 BMUs, the joint external review noted that 139 have the smear microscopy centres (SMC) but only 95 (68%) were functioning in the first quarter of 2019. In some provinces like East Sepik, Bougainville and Simbu this means that one SMC serves a population of about 400,000. In a geographically difficult terrain of hills and islands with bad roads and transportation, this poses great difficulties for the population.

The provincial laboratories are the next level after the SMCs. At the national level is Central Public Health Laboratory (see comment on CPHL in Annex 3). Its core functions, serve as the national reference laboratory for specialised TB diagnostics. The Queensland Mycobacterium Reference Laboratory (QMRL) in Brisbane, Australia serves as the designated TB Supra-National Reference Laboratory (SRL) providing reference laboratory services to the PNG NTP. The CPHL is also established to perform both solid and liquid TB culture (Appendix 4). Currently, there are 64 GeneXpert locations performing Xpert® MTB/RIF in the country (Appendix 5). The GxAlert system is installed on all functioning GeneXpert instruments throughout the country, however the result reporting function is not connected optimally to the health care workers or clinicians. There is a high turn-around time for results to reach the clinicians/patients for making clinical decisions. Sample transportation is a challenge and most Xpert® MTB/RIF testing sites are underutilized. There have been challenges with replacement of modules for GeneXpert instruments. These challenges need to be overcome for universal DST to take effect.

There are limited intermediate level laboratories at the provinces that can carry out trainings, supervision and monitoring, external quality assurance (EQA), assess the specimen transportation system, Xpert® MTB/RIF and microscopy networks of the provinces. The existing laboratories can be upgraded to carry out these functions. The provincial laboratories and peripheral SMCs need laboratory infrastructure upgraded and trained human resources.

TB epidemiology

The NTP reporting system is aligned to the WHO recording and reporting (R&R) framework (2006) and each BMU is provided with these R&R tools (paper-based). TB Officers in the BMUs are responsible for recording and reporting and quarterly reports are sent to the provincial health office and to the National TB Program. Among the functional BMUs, the reporting rate is about 80%. The TB database at the national level is kept in Excel®. Even though there is a functional Electronic National Health Information System (eNHIS), adopted by the National Department of Health for the management of health information system, TB data are not fully incorporated into the eNHIS.

As per the GTR 2022, the prevalence of TB in PNG is estimated to be 424 per 100,000 which translates to about 42,000 new cases per year. In 2021, as per the program data, the notification rate was 290 per 100,000, with notification of a total of 28,873 new and relapse cases. The estimated treatment coverage is about 68%. In other words, about a third of the TB patients were missing i.e. not diagnosed or notified.

Thirteen of the 22 provinces notified 80% of the total cases. NCD province alone reported 24% of the total cases in the country (Appendix 6).

TB Case Notification

The trend of notification of new and relapse cases – The case notification rate has flat lined from 2014 onwards – 329 per 100,000 in 2014 to 290 in 2021 (figure 1). A low proportion of presumptive cases are identified from among the out-patients.

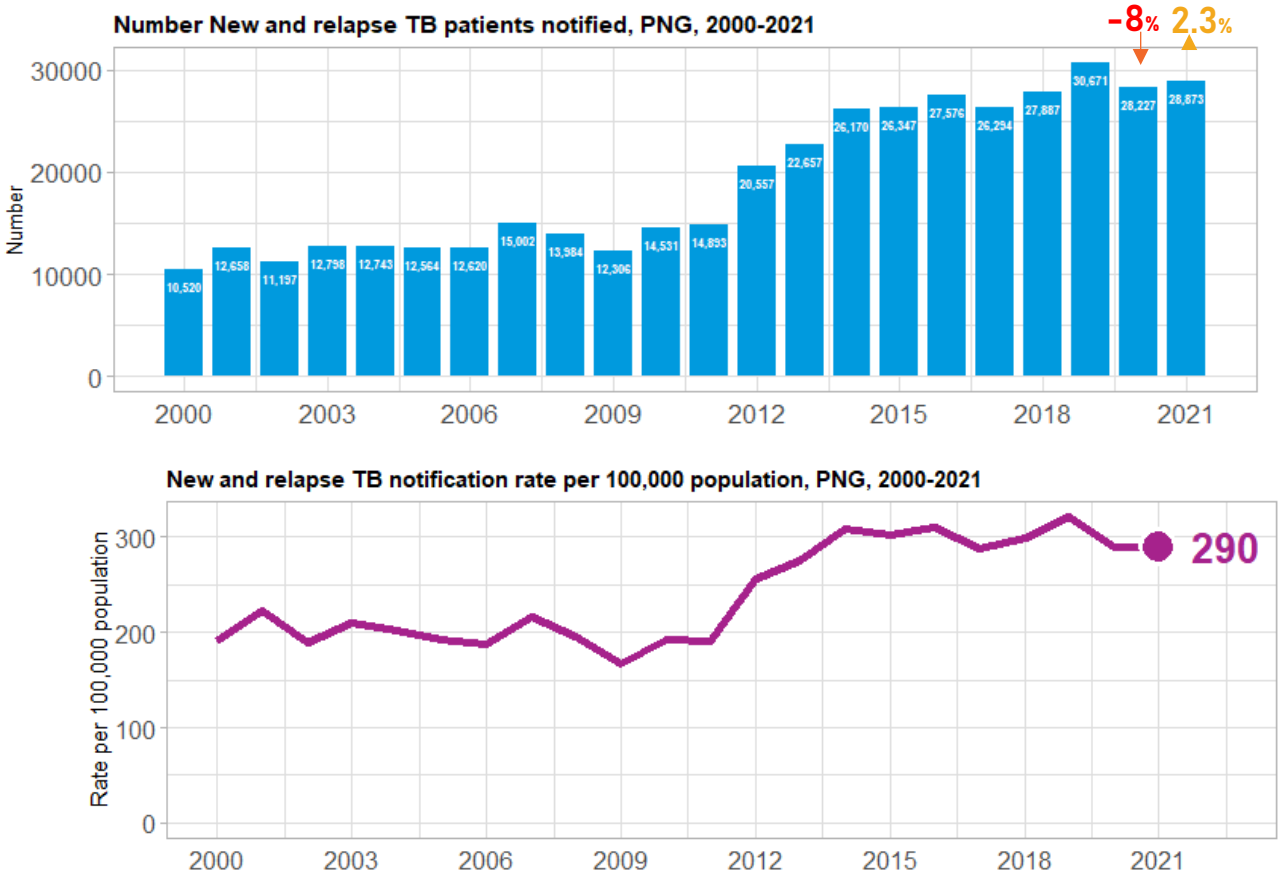


Figure 1: Number and rate of new and relapse TB cases, 2000 – 2021,

Classification of cases **–** In 2021 among all cases, the proportion of new and relapse TB bacteriologically-confirmed pulmonary TB is 36%, extra-pulmonary TB is 47%. Proportion of pulmonary bacteriologically confirmation is relatively stagnant from 2013 to 2018 (26-30%). Number and proportion of extra-pulmonary TB (EPTB) among new and relapse cases is showing an increasing trend from 2013 to 2018 (figure 2).

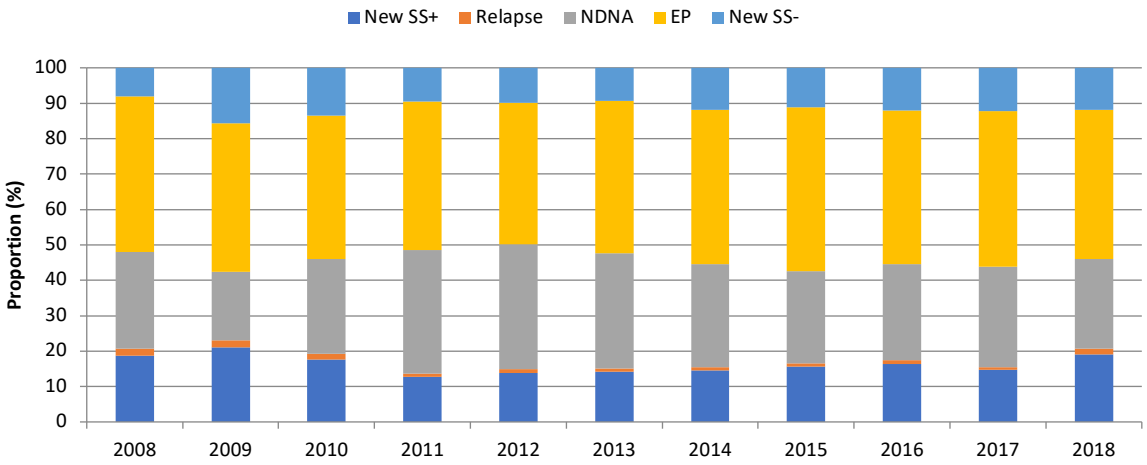


Figure 2: Proportion of notified case types by year, 2008 – 2018

Almost half of new and relapse cases in 2016 and 2021 were found in the age group of 15-24 with notification in males slightly more than in females (M:F ratio was 1.6). Of note, the sex difference in other high burden countries is seen to be much more implying that not enough young males are likely getting diagnosed in PNG.

Childhood TB

In 2021, 23% of the annual notified TB cases were children 1-14 years of age. The 13 provinces that notified 80% of the cases, also notified 80% of the childhood TB cases. Three provinces (NCD, Morobe and WNB) notified almost half (47%) of the total childhood TB cases in the country indicating a centralized approach to management. Bacteriological confirmation of TB at PMGH has increased, where nearly 1,100 children were started on treatment in 2019.

The ratio of TB cases among children 0-4 years old compared to 5-14 is below the expected range of 1.5-3.0 (0.82 in 2018). This might indicate a higher proportion of under-diagnosis and/or underreporting among children age 0-4 years old compared to children in 5-14 years age group or over diagnosis of children in 5-14 years age group, or both.

The reasons for children representing such as a high proportion of the total TB notifications in PNG are not known but contributing factors are likely to include: population demographics, i.e. children make up a large proportion of the PNG population compared to many other countries; under-detection and reporting of TB in adults, i.e. a falsely low denominator; a high prevalence of known risk factors for TB such as low BCG coverage (60.4%) and malnutrition; and the reliance on clinical

diagnosis in the majority of children can lead to over-diagnosis, especially of pulmonary and lymph node TB.

On average, 69.4% children age 12-23 months received BCG. PNG Paediatric Society recommends treatment of malnutrition to see if the malnutrition resolves before initiating treatment (especially if the child is very ill).

Treatment success rate

For the 2017 cohort success rate was 68% with 17% lost to follow-up, 8% 'not evaluated', died 3% and failure on treatment 1%. The underperformance in treatment success rate has persisted since 2013 when it was 62%. Low success rate is true for childhood TB cases as well. For the 6047 children started on treatment in the 2017, success rate was 67%, lost to follow-up 18%, 'not evaluated 11%, failure 2% and death 1%. Thus, 29% children were either lost to follow-up or were 'not evaluated'.

Mortality

TB mortality is estimated to be 5100 deaths per year and the HIV negative mortality rate is high at 51 per 100,000 (Appendix 7) and this has increased from 40 in 2015.

Mortality among children with TB is high in PNG. For example, case fatality rate for children admitted to hospitals with TB was 8.69% based on data collected from 18 hospitals (PHR, 2018). This may reflect a high rate of disseminated forms of EPTB (TB meningitis, military TB) and late presentation of illness, with confounding malnutrition and/or HIV.

MDR/RR-TB

The estimated RR/MDR-TB rate was 4% among new cases and 23% among previously treated cases in 2021 translating to approximately 2,400 MDR/RR cases per year in PNG. Only about 17% of the estimated cases were started on treatment in 2021 (figure 3). A cross-sectional study (2012-14) in 40 clusters in 4 provinces that see majority of the patients reported MDR/RR in 2% of new cases and 17% among previously treated. Prevalence of isoniazid-resistant TB is not known.

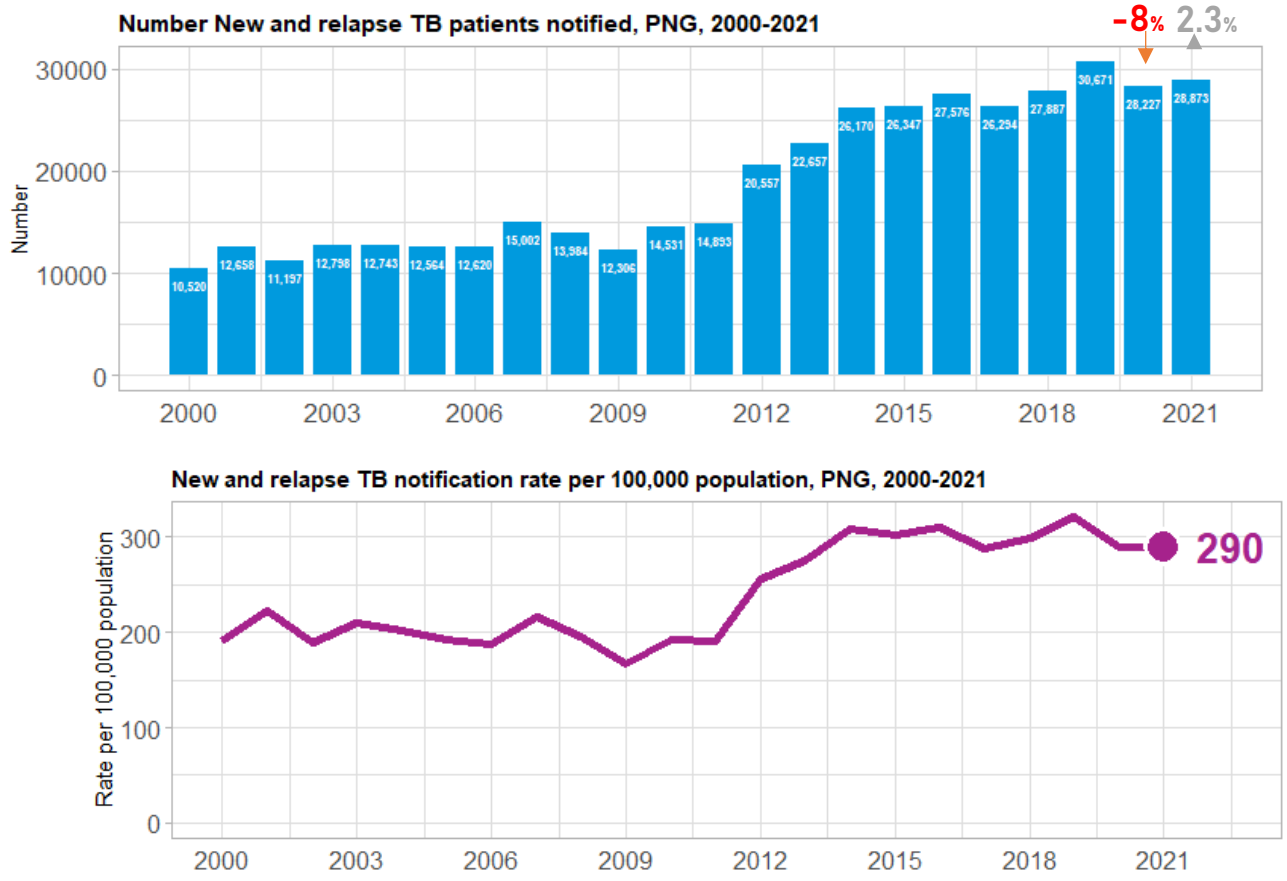
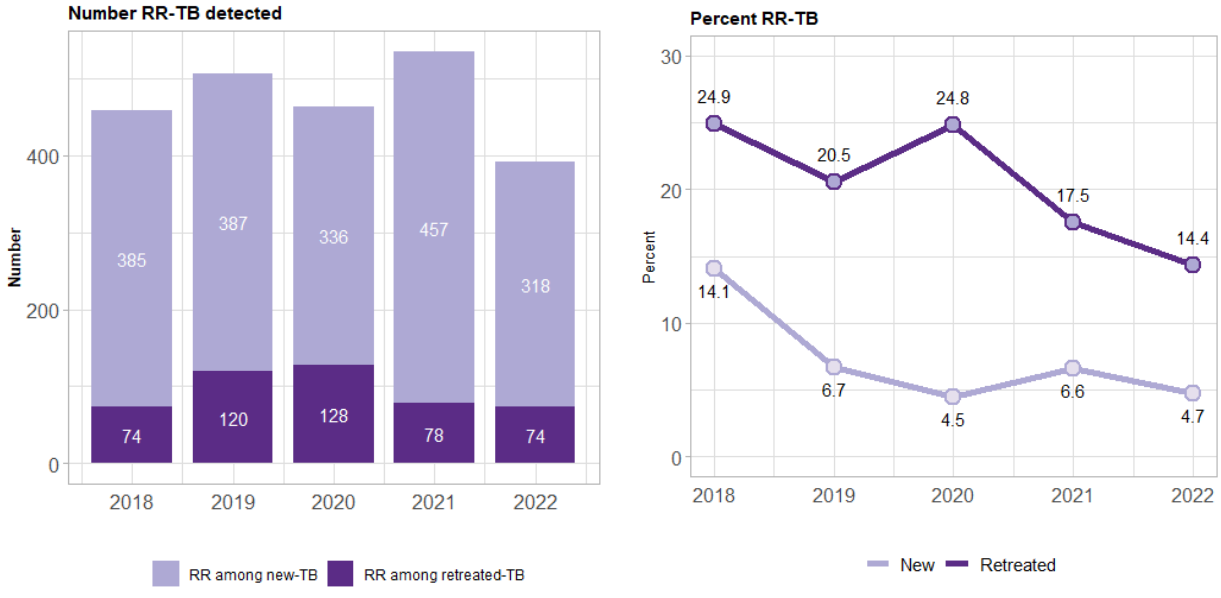


Figure 3: Percent of RR-TB among new and retreated TB cases with DST results to R



Fg

TB/HIV

PNG is a high-burden TB/HIV country and has uneven distribution of HIV infection in the four regions, with the highest being in the Highlands (figure 5). HIV is a significant risk factor for TB with about 12%-17% newly enrolled PLHIVs diagnosed to have TB.

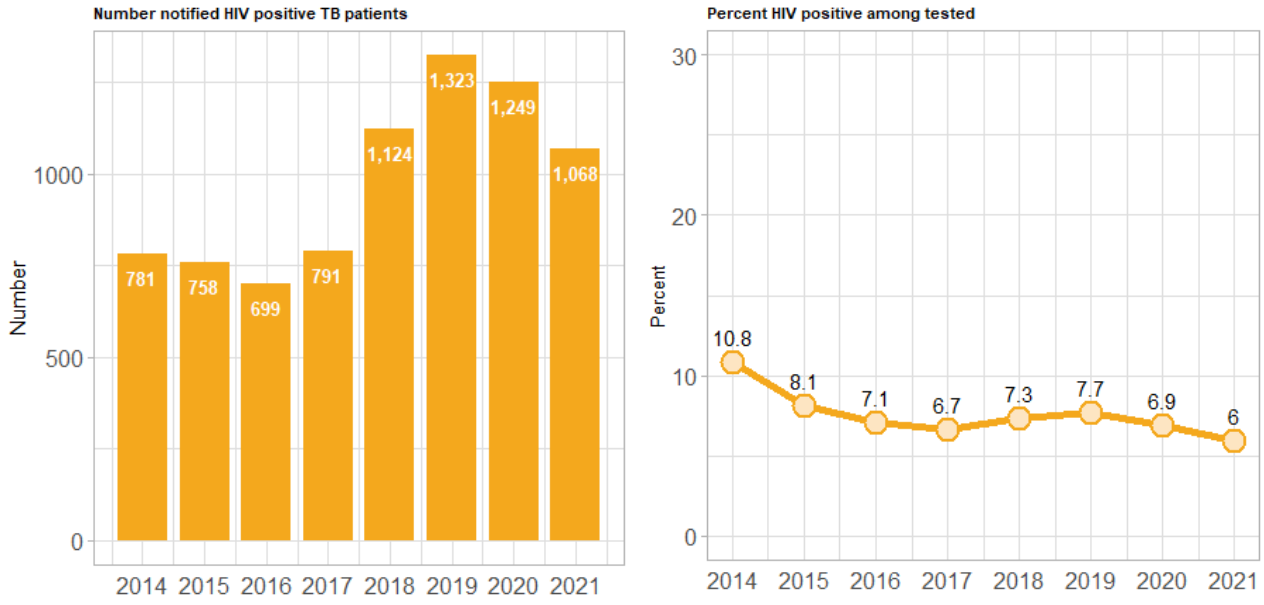
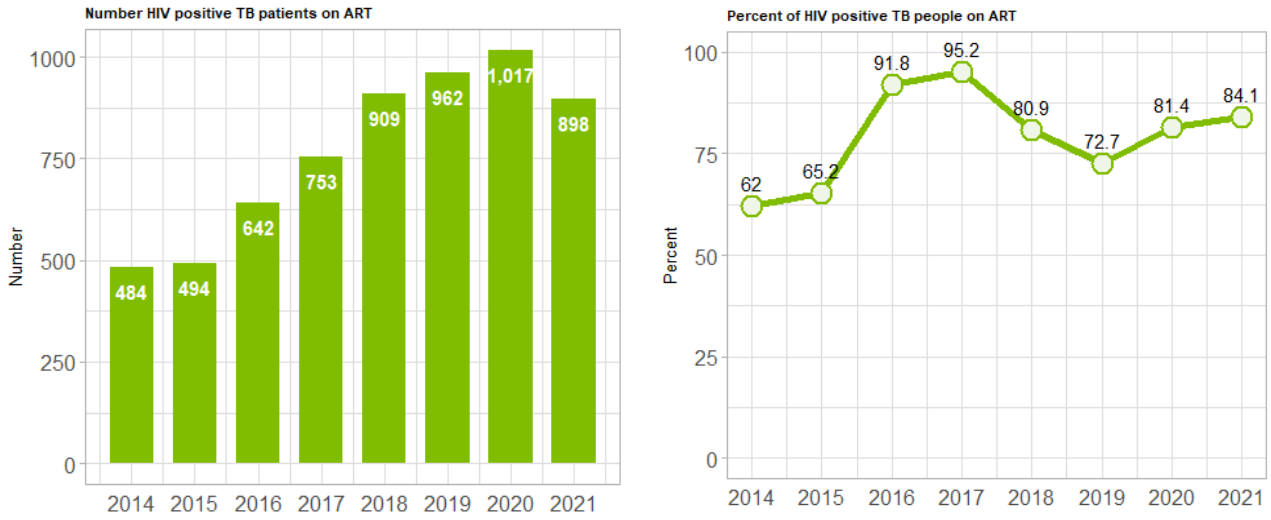


Figure 3: TB/HIV co-infection rates in provinces in 2018 (program data)

HIV testing is done for about half of the diagnosed TB patients (figure 6). Common reasons for low testing was irregular supply of HIV test kits and poor integration of TB/HIV services with poor cross-referrals and poor exchange of information. About half of the TB patients were tested, of whom 7% were HIV positive and most of them (95%) were started on anti-retroviral treatment in 2017. However, that proportion declined to 81% in 2018 because of interruption in supply of ART.



TB preventive therapy (TPT) among PLHIV is low with the latest being 18%. The earlier challenges were in reporting and are now being addressed in the surveillance system.

National TB patient cost survey findings

A study of patient costs associated with seeking and receiving care for TB found that the proportion of TB affected households facing catastrophic total costs (the total of medical and non-medical out-of-pocket payments and indirect costs exceeding 20% of the annual household's income) due to TB was 34%. Overall, DRTB patients incurred 3 times higher costs than DSTB. Economic impact of TB on individual and household income was high. When comparing income before and after the diagnosis of TB, patients lost 36.5% of their individual and 24.8% of household income. The main social consequences of TB were food insecurity (33.5%), social exclusion (31.7%) and loss of job or unemployment (23.0%).

Prevalence of risk factors for TB

- Malnutrition - Among the under-5 children, 48% are stunted. 55% of children in the lowest wealth quintile are stunted compared to 26% in the highest quintile. About 36% of TB cases in 2021 are estimated to be attributed to undernutrition.
- Diabetes – There has been an almost three-fold increase in prevalence over the past 25 years; Males: 5.9% in 1980 to 15.4% in 2015; Females: 5.5% in 1980 to 14.3% in 2015. Diabetes accounts for 5% of TB cases in the country while HIV accounts for 10% of TB cases.
- Smoking - The prevalence of smoking among adult males is still very high in 2021 (Males: 54%; Females 25%). About 13% of TB cases is attributable to smoking while 8% is attributed to alcohol.
- Poverty – The proportion of people living below international poverty line is 38% and those covered by social protection systems is negligible (approximately 4.2%).

Achievements, gaps and challenges

Achievements from previous NSP

Following achievements are noteworthy from the period 2015-19.

1. GeneXpert sites performing Xpert® MTB/RIF testing have steadily expanded in the country. By the end of 2022, there were 64 functioning GeneXpert sites performing Xpert® MTB/RIF testing.
2. Implementation of a community-based care with focus on patient-centered approach in Daru, WP and NCD has yielded positive treatment outcomes.
3. Postal Department (Post PNG) was involved in sputum transportation from provinces to CPHL for sputum culture and DST.
4. Daru TB program (part of the Emergency Response to MDR-TB) has resulted in high treatment success rate was 88.2% for the 2017 enrolment cohort and 88.1% for the 2016 enrolment cohort.
5. Childhood TB project has received focus and diagnostic algorithm is in place and training for gastric aspirate and fine needle aspiration for lymph nodes is ongoing. At PMGH the percentage of children receiving an Xpert test increased from 1% (4/381) in 2016 up to 66% (709/1069) in 2019. The bacteriological confirmation of DS-TB in children increased from 0% (0/381) in 2016 to 40% (283/709) in 2019 among those who received an Xpert test.
6. Quality assured medicines are continued to be funded by the PNG Government; items procured in line with WHO recommendations; streamlined disbursement process is in place.

Evolving issues

As of end 2022, some interventions are promising. One- or two-year results of these are discussed below.

Community TB

Community TB prevention and care has been extended for patient-centred care in the NCD. The initiative was commenced in mid-2017 and identified several community outreach sites for treatment continuity, trained community treatment supporters to link outreach sites with BMUs. The community-based approach has been seen to be successful in promoting treatment adherence and bringing down loss to follow-up and 'not evaluated'.

The following were key features of the community TB initiative in NCD:

- The initiative has resulted in significant increase in treatment success rate with decrease in loss to follow-up and 'not evaluated'. This has also resulted in decrease in number of patients whose sputum was not done or not available.
- CTS and Treatment Support Supervisors (TSS) were deployed to provide support to treatment and care each of whom supported about one hundred patients or about 10-15 new patients every month. Patients were assisted for transport fares to enable clinical review at the BMU.
- The proportion of contacts screened increased as did the provision of IPT for families of patients who were supported by CTS.

Childhood TB

Since 2015, the PNG Paediatric Society has worked closely with multiple stakeholders to advance care and treatment for children and families with TB, MDR-TB, TB-HIV, and malnutrition. The program has

improved the uptake of Xpert, bacteriological confirmation of TB and increased HIV testing at PMGH and three more provinces.

Management of RR/MDR TB care in the hot spots

PNG identified three hot spots for MDR-TB including NCD, Western province and Gulf provinces. As a response to the drug-resistant TB crisis in the country, a national emergency was declared in 2014 and an Emergency Response Team was established to oversee the coordination and implementation of the response. This response was implemented by NDoH and PHAs of the three provinces with support.

This response included high level political commitment, joint planning, resource mobilization, community engagement and strengthening TB case detection and treatment[3]. Management of MDR-TB has been remarkably improved in Daru through community-based DOT at Daru Accelerated Response to TB sites. The proportion of treatment success reached 87.3% among RR/MDR-TB patients registered in 2016.

In NCD, DR-TB management has been improved in Gerehu hospital with support from MSF-France. To reduce loss to follow-up MSF-France has implemented outreach activities such as home DOT, DS-TB and MDR-TB patients tracing, patient education and counselling, home assessment, exploration, and outreach activities. The number of RR/MDR-TB patients enrolled in treatment in Gerehu hospital has increased from 33 in 2017 to 54 in 2019.

Challenges anticipated for NTP in 2023-2027

The following challenges are identified based on the Joint External Review of TB program in May, 2019 and stakeholder consultations and TB epidemiological review in January and February, 2023.

1. The performance of key indicators for TB remain unchanged since 2015
    a. Treatment success rate has remained less than 70% as was the case before 2015
    b. Treatment coverage has flat lined since 2013
    c. TB mortality remains high with an estimated 5100 TB deaths each year
2. National survey on TB patient cost showed that 42% of TB affected families face catastrophic cost due to TB
3. Diagnosis of TB is confined to a few centres. Referral system remains weak. Most patients are given drugs without DOT and a significant proportion becomes ‘not evaluated’ or ‘lost to follow-up’.
4. Sputum transportation from the periphery to the SMCs remains a huge challenge for sputum microscopy and will continue for DST.
5. Currently, CPHL is not providing TB culture and DST due to infrastructural issues.
6. Challenges with M&E system:
    a. Data is not being used for supervision and quality improvement;
    b. Reporting from some BMUs continues to be challenging (over 20% of BMUs either do not report or significantly delayed) and the schedule for scaling up of TB electronic module is not yet defined.
    c. There is urgent need to revise all TB recording and reporting tools in line with the revised WHO guidelines
7. The adaptation and roll out of of recent WHO guidelines on shorter all-oral regimens for DR-TB, shorter (4-month) regiment for DS-TB, and TPT needs due focus.

SWOT analysis

Table 1: NTP SWOT analysis

STRENGTHS	WEAKNESSES
— Xpert® MTB/RIF available in all provinces and used as the diagnostic test of choice — Active case finding done in Daru — Availability of quality assured TB drugs and standardised regimen — High treatment success in NCD and Daru where community support and enablers are provided — Effective M&E team at the NTP — TB and HIV/AIDS and STIs programs established in the NDoH — Patient cost survey completed, and results disseminated — Availability of a TB PSM focal person to coordinate supply and distribution of TB drugs and commodities — Support of the CPHL by the Australian QMRL for 1st and 2nd line DST	— Low treatment coverage — High proportion of childhood TB — High proportion of NDNA and clinically diagnosed cases — High LTFU and TB mortality — Only 63% of diagnosed DR-TB getting DST done — Only 17% of estimated DR-TB cases are initiated on treatment — Low index of suspicion among HCWs — Inadequate active case finding, contact tracing and preventative therapy — Under-utilisation of the Xpert® MTB/RIF and only 34% of BMUs have functional microscopy — No structured sputum transportation system from periphery to microscopy centres/BMUs — Poor capacity of HCWs to screen for and diagnose TB — Poor recording and untimely reporting of TB services provided by PHAs — Poor infrastructure at CPHL — Weak health system and demotivated health staff — Poor access to radiology and histology services — No capacity building initiatives to improve NTP leadership, management and coordination skills
OPPORTUNITIES	**THREATS**
— Strong political commitment to support TB — The full replenishment of the Global Fund — Roll out of the eNHIS — Roll out of mSupply	— Inconsistent and insufficient domestic funding to support procurement of TB drugs and laboratory consumables — High donor dependency for program implementation — High staff turnover and ageing workforce — Tribal conflict which disrupts provision of TB services

— Roll-out of PHAs that improves local ownership, coordination and use of resources for public health programs — Opportunity for multi-sectoral engagement to address the high catastrophic costs incurred by TB patients and their families — *Wantok* system that can be utilised treatment supporters — Strong technical (WHO, Burnet Institute) and financial partners (DFAT, ADB, Global Fund, World Bank, Oil Search) that support the NTP — Health system strengthening supported by ADB and World Bank projects —	— Except for NCD and Western Province, no community health systems in place — Lack of ownership and coordination by the PHA — High levels of poverty, illiteracy, stigma and discrimination — High levels of undernutrition among children — Increasing levels of risk factors for TB infection namely diabetes, smoking and alcoholism

Gap analysis

These are the major gaps identified in the TB control efforts in the country:

1. **Persistent low treatment success rate or low adherence to treatment.**
   There has been persistently low treatment success (below 70%) since 2015 which is much lower than the global average of 86%. Low treatment success is due to high loss to follow-up and high 'not evaluated'. This is indicative of low quality of services and poor M&E systems.
2. **Sputum not available or not done/weak diagnostic system.**
   Large proportion of TB cases are clinically diagnosed i.e. they are started on 6-month treatment for TB without the benefit of a diagnostic test.
   a. Lack of sputum transportation arrangement from periphery to SMC is a challenge.
   b. Many microscopy centres are not functioning.
   c. Physical access to diagnostic service by most patients is a challenge due to difficult geographic terrain.
   d. There is high turnaround time for TB laboratory results resulting in initiation of treatment by clinicians without waiting for results.
   e. Underutilization of the Xpert® MTB/RIF system remains to be a major challenge.
   f. An intermediate laboratory at the provincial level will greatly support the poorly performing SMCs.
   g. There is increased need for bacteriological diagnosis of child TB: roll out of stool and gastric aspirate for GeneXpert testing is yet to be materialized.
3. **Organizational gaps**.
   a. Overall the NTP is understaffed to cover all the areas of TB prevention and care. Many provinces do not have health professionals specifically for the coordination and programmatic management of NTP activities. In addition, there is no identified TB coordinator working at the district level.
   b. A significant number of health centres and sub-health centres have no health staff identified and responsible for the TB activities.
   c. Keeping the local context of status of health system, status of TB infrastructure, urban/rural population ratio, presence of CBOs/FBOs/CVs, prevalence of HIV, etc. into consideration, the provincial level TB plans are not yet developed.
   d. The performance of provincial TB coordinators was considered as less than optimal, because of outdated training and lack of functional optimization/acceptance in the provincial level health system.

National Strategic Plan 2023-2027

The National Strategic Plan for Tuberculosis of PNG is based on the WHO End-TB Strategy and is guided by the overall PNG National Health Plan.

Vision

The vision is that Papua New Guinea has zero TB deaths, zero TB disease, and zero TB suffering.

Goal

End the TB epidemic in Papua New Guinea by 2035.

Milestones for 2027

1. Reduction in number of TB deaths in 2027 by 50% compared to what was reported in 2015
2. Reduction in TB incidence rate in 2027 by 20% compared to what was reported in 2015
3. Proportion of TB affected families facing catastrophic cost reduced to less than 30%

In PNG, there has not been a significant change in either of the three milestones since 2015. The treatment success rate and the case notification rates have not changed during the period of last NSP. Thus, very focused efforts are required in the current NSP.

Suggested approach **-** To decrease the mortality and to decrease the transmission of infection in the community and thus, bring down the incidence rate, first and foremost, the treatment success rate should improve. Secondly, the diagnosis of TB should improve so that treatment coverage improves, and bacteriologically positive cases are diagnosed and put on treatment as soon as possible. Community-based TB interventions will assist in both of these objectives.

Strategic objectives

The objectives of the NSP 2023 to 2027 are;

1. By 2027, to have achieved treatment success rate of at least 85% for all forms of TB.
2. By 2027, at least 90% of people with TB provided with universal drug susceptibility tests.
3. By 2027, at least 90% of patients with TB tested and know their HIV status.
4. By 2027, the technical and managerial capacities of the National Tuberculosis Program at the national, regional, provincial and district levels for the provision of quality TB services are strengthened.

Objective 1: By 2027, to have achieved treatment success rate of at least 85% for all forms of TB.

Intervention 1.1 – Expand access to TB treatment centres

The NTP will increase access to TB treatment sites across the country through the establishment of community health posts and integration of TB services into the general health care system. This will involve the integration of TB services into existing health care systems.

Activities

1.1.1 Assess health facilities targeted for integration and provision of TB services (specifically BMU)
1.1.2 Commission and de-commission of BMUs
1.1.3 Training of health workers on TB management
1.1.4 Provide diagnostic equipment and supplies, anti-TB drugs, recording and reporting tools

Intervention 1.2 – Community-based service delivery to address access barriers

Engagement of NGOs, CBOs, FBOs and CSOs in TB control activities alongside the public health system will extend the reach of the BMUs closer to the doorstep of the patients. Because of the large distances to be covered and high transportation costs, the patients are unable to visit the health facilities or they incur catastrophic costs.

A community-based TB program is expected to increase the treatment success rate of DS-TB including in children, and of DR-TB. It is also expected to improve diagnosis by decreasing sputum not done, not available and increase case notification by ensuring all diagnosed are started on treatment and by increasing examination of the passively identified presumptive cases. A community-based TB program is also expected to increase contact tracing and TB preventive treatment.

The community-based approach will be implemented using different models of care throughout the country. PHAs will build CBOs and or mobilize existing CBOs and community volunteers for TB control. Incentives and support for CBOs should be provided by PHAs and partners. NTP in collaboration with the PHAs will develop TORs for the CBOs engagement.

Activities

1.2.1 Develop national guidelines on community TB prevention and care
1.2.2 Review the training manual/ curriculum for CTS to include new roles/ tasks
1.2.3 Development / procurement of volunteers' kit
1.2.4 Establishment and engagement of CTS and CBOs (NATA, provincial TB CBOs) for TB prevention and care in the provinces
1.2.5 Signing of MoUs between PHAs and CBOs for engagement in TB prevention and care
1.2.6 Training of CBOs/FBOs and community treatment supporters by NTP and partners
1.2.7 Develop IEC materials to reduce stigma in the general population and among health workers
1.2.8 Incentives, logistics and communication support to CBOs by PHAs and partners
1.2.9 PHAs to conduct quarterly review meetings with the CBOs to monitor implementation
1.2.10 Support the linkage of CTS with the health facilities for transport and referral of patients for diagnosis and supervised treatment
1.2.11 Integration of CTS to Village Health Assistant program at PHA level
1.2.12 Training of community volunteers on psychosocial counseling/care
1.2.13 Conduct TB patient support group meetings

Intervention 1.3 – Prompt initiation of appropriate treatment for all people with DS and DR-TB, using people centred approach and with patient support.

With the expansion of Xpert® MTB/RIF sites, the decentralization of diagnosis is expected steps will be taken to decentralize the DOT. There is need for training of BMU staff on treatment guidelines.

Activities

1.3.1 Update, print and disseminate national treatment guidelines for DS and DR-TB
1.3.2 Develop patient education and counselling (PEC) guidelines as part of "people-centered approach", train health workers on PEC
1.3.3 Assessment of the BMU workload by NTP and PHA. The BMUs that have more than 100 patients on treatment should be considered for either to have more BMUs in the area or recruit additional HR to include neighbouring facilities for DOT or have the engagement of CBOs/FBOs with CTS
1.3.4 Training of BMU staff on TB care for DS and DR-TB including treatment of children
1.3.5 Wall-chart displaying TB care essentials for DS and DR-TB will be displayed in all health facilities

Intervention 1.4 – Strengthen the management of childhood TB

Gastric aspirate for TB diagnosis is difficult because health staff not working in paediatric wards need to be trained in inserting the NG tube. Alternative WHO-recommended specimens such as stool for GeneXpert testing will be gradually rolled out after in-country validation.

Activities

1.4.1 Recruit and support National Childhood TB focal person based in NTP
1.4.2 Identify, train and support provincial childhood TB focal point
1.4.3 Update, print and disseminate guidelines on childhood TB and training manual
1.4.4 Introduction of shorter treatment regimen for DS-TB among children
1.4.5 Train health workers (clinicians, HEO, nurse) on childhood TB from all the provinces
1.4.6 Capacity development of human resource for childhood TB through engagement of PNG Paediatric Society and University of PNG, through international training on childhood TB
1.4.7 Provide nutritional support for children diagnosed with active TB
1.4.8 Introduction of stool for diagnosis of TB among children
1.4.9 Sensitization of pediatricians on childhood TB
1.4.10 National mentoring program/exposure visit on childhood TB and HIV (2-week program)

Intervention 1.5 – Strengthen Programmatic Management of Drug-Resistant Tuberculosis (PMDT)

NTP will ensure the procurement of second-line anti–TB and ancillary drugs and that 100% of the confirmed DR-TB cases will be started on treatment through a scale up of ambulatory care with the support of treatment community supporters and limited health facility-based model with infection control and pharmacovigilance.

Activities

1.5.1 Update, print and disseminate the PMDT guidelines
1.5.2 Identify and train provincial MDR-TB focal point
1.5.3 Establish and renovate MDR-TB wards in all provincial hospitals with infection prevention and control measures
1.5.4 Build human resource capacity including training of clinicians on MDR-TB management
1.5.5 Establish and support functional PMDT Core team at the national and provincial levels
1.5.6 Establish ambulatory/community-based model of care for DR-TB patients
1.5.7 Provide food and transport incentives for MDR-TB patients

1.5.8 Biannual review meeting on PMDT
1.5.9 Advanced clinical training on MDR-TB management (The Union training)
1.5.10 Supportive supervision and mentoring on MDR-TB management (national to PMDT sites) – yearly
1.5.11 Regional Green Light Committee mission for assessment of the progress of implementation of PMDT
1.5.12 Implement Infection prevention and control measures for MDR-TB management
1.5.13 Provide communication support to physicians to coordinate PMDT activities in the provinces

Intervention 1.6 – Ensure the provision of quality assured anti-tuberculosis drugs and active drug safety monitoring (aDSM)

The NTP will procure quality-assured anti-TB drugs (including paediatric formulation), ancillary drugs and other supplies, their distribution, storage, and use. The NTP will ensure that all recommended quality-assured TB drugs are incorporated into the national essential drugs list. The storage capacity and management of provincial medicine stores/warehouses will be improved. TB drug pharmacovigilance system (active drug safety monitoring and management (aDSM)) will be improved, which will include the necessary recording and reporting tools for adverse drug reactions.

Activities

1.6.1 Develop national guidelines on aDSM
1.6.2 Quantification and forecasting of anti-TB drugs and medical supplies
1.6.3 Procurement, supply & distribution of quality-assured anti-TB drugs and commodities including child-friendly formulations and ensure that they are stored properly
1.6.4 Support roll out of electronic supply monitoring tool in the BMUs
1.6.5 Ensure availability of ECG machines and paper below the provincial level
1.6.6 Ensure access to blood biochemistry tests without having to travel to provinces
1.6.7 Support provincial therapeutic committees under PHAs on aDSM for TB
1.6.8 Support TB medicines quality monitoring

Objective 2: By 2027, at least 90% of people with TB provided with universal drug susceptibility tests.

Intervention 2.1 – Expand access to early diagnosis of all people with DS and DR-TB

World Health Organization endorsed rapid TB diagnostics that should be available to all who need it. According to WHO and the national guideline, Xpert MTB/RIF will be used as the initial diagnostic test for all presumptive TB cases. Universal DST will help in identifying patients with DS-TB and DR-TB at the outset and thus, appropriate treatment can be started immediately. Diagnostic algorithm is in place and Xpert® MTB/RIF network has expanded to 64 sites. However, the joint external review noted under-utilization in some BMUs and high load in some other BMUs resulting in high turn-around time.

Activities

2.1.1 Expansion of GeneXpert sites and instruments, including 10 color machines
2.1.2 Assess the optimal placement of these machines to ensure maximal impact
2.1.3 Strengthen the implementation of the GeneXpert based on diagnostic algorithm and update algorithms for the diagnosis of TB

2.1.4 Strengthen active case finding activities in high burden districts
2.1.5 PHAs to strengthen the provincial level labs as intermediate laboratories through recruitment of provincial laboratory coordinators
2.1.6 Strengthen provincial laboratory supervision and quarterly EQA by the CPHL
2.1.7 Train and retrain staff on GeneXpert at all levels including stool test
2.1.8 Procurement of LED microscopes for TB BMUs
2.1.9 Train and refresher of laboratory technicians on smear microscopy
2.1.10 Training of health workers for performing gastric aspirates and lymph node biopsy at provincial hospitals
2.1.11 Support and strengthen sputum transportation system
2.1.12 Training of laboratory personnel on sputum transportation (IATA training)
2.1.13 Procure 3 cargo drones for specimen and medicine transportation in selected provinces
2.1.14 CPHL to develop and update SOPs for provincial (intermediate) TB laboratories
2.1.15 Provide communication equipment and mobile data
2.1.16 Upgrade GxAlert to ASPECT in the 22 provinces including communication support for HCWs for follow-up
2.1.17 Develop and print algorithm of universal DST
2.1.18 Wall-chart of an algorithm of universal DST will be displayed in all health facilities
2.1.19 Conduct INH DST among patients who failed to convert at 2 months using 10-color GeneXpert
2.1.20 Conduct national drug-resistance survey
2.1.21 Annual service and maintenance of TB culture laboratory
2.1.22 Supervision and monitoring by Supra-national Reference Laboratory (SRL)
2.1.23 Procurement of naso-gastric tubes to facilitate gastric aspiration to diagnose child TB (8Fr and 10Fr)
2.1.24 Training of HCW's to perform fine needle aspiration (FNA) to increase diagnosis of EPTB
2.1.25 Procurement and distribution of sodium bicarbonate for gastric aspirate samples in children
2.1.26 Procurement of portable digital x-ray with computer aided detection
2.1.27 Training/capacity building for TB laboratory staff, x-ray technicians
2.1.28 Strengthening infrastructure support to GeneXpert sites (procurement of air conditioners, solar panels)

Intervention 2.2 – Contact tracing for pulmonary bacteriologically confirmed TB cases

Contact screening of diagnosed adult patients is erratic in the country. Apparently, it was not included in the TORs of the treatment supporters and a revision is being planned.

Activities

2.2.1 Develop SOPs for contact tracing
2.2.2 Training of health workers on contact tracing
2.2.3 Engage community volunteers in contact tracing through consultative meetings with various stakeholders including the community opinion leaders
2.2.4 Provide communication and transport support for contact tracing activities
2.2.5 Develop Information, Education and Communication (IEC) materials on TB basic facts

Intervention 2.3 – Systematic screening of high-risk groups

This NSP will prioritize community-based systematic screening of high-risk groups in areas of focalized transmission. Comprehensive policy and guidelines on community-based systematic screening for TB will be developed and implemented. The focus will be on the risk groups with potentially the highest yield including 1) household contacts; 2) urban areas where internal migrants are settled in poor housing; 3) congregate settings (prisons, school, etc.); 4) PLHIV; and 5) health care workers.

Activities

2.3.1 Conduct systematic screening in NCD and prioritized districts
2.3.2 Screening for active TB among occupational hazard settings and routine monitoring (e.g. CXR, TST/IGRA of health care workers)
2.3.3 Engagement of volunteers under CBOs/FBOs for community case-finding and referrals
2.3.4 Household contacts screening (see 1.3)
2.3.5 Screening of health care workers working in high-risk health facilities
2.3.6 Set up TB diagnostic and treatment services in health facilities within prisons
2.3.7 Support prisons in TB screening among prisoners (MoU with Correctional Institutional Services)
2.3.8 Conduct quarterly supervisory and mentorship visits to BMUs providing TB services to prisons
2.3.9 Conduct systematic screening for active TB in prisons in all provinces
2.3.10

Intervention 2.4 – Treatment of TB Infection

Treatment of TB infection will be considered as an extension of efforts for active TB case finding including contact investigation in all settings. In consultation with the national program and technical partners, the introduction of a combination of drugs (shorter options) such as 1HP and 3HP for TB preventive treatment will be considered during the NSP period. Preventive treatment may also include the management of DR-TB contacts as new evidence emerged.

Activities

2.4.1 Develop and roll out national guidelines on TB preventive treatment
2.4.2 Procurement of tests (TST) for TB infection testing
2.4.3 Procurement of treatment regimens recommended for TB infection
2.4.4 Develop, print and disseminate R&R tools for TPT
2.4.5 Training on TPT implementation to Provinces (Clinicians, HEO, CHW, CTS)
2.4.6 Develop comprehensive package (SOP) for implementation of TPT targeting HCWs, community volunteers
2.4.7 Training of CBOs, CSOs, FBOs to implement community-based TPT and monitoring
2.4.8 Designing and printing of the TPT IEC materials
2.4.9 PHA SEM to conduct advocacy and sensitization activities on TPT
2.4.10 PHAs to conduct TPT community awareness campaign for its uptake

Intervention 2.5 – Engagement of the private sector for TB care

There are about 50 clinics/private providers in Port Moresby. However, this is anecdotal. All around PNG there are many private sector companies in the sectors of oil and gas, and mining. In some provinces, they have their own health facilities for their employees. On occasions, they share information with the public facilities and some of them work closely with the public health facilities

allowing sharing of resources. Successful engagement with the private sector will enable early diagnosis, early initiation of treatment, successful outcomes and complete reporting.

Activities

2.5.1 Baseline assessment for public-private partnership in Port Moresby and other major cities
2.5.2 Conduct workshop/meetings of stakeholders in private sector engagement
2.5.3 Development of a Road Map on PPP/PPM engagement
2.5.4 Develop and disseminate national TB PPM guidelines and policy
2.5.5 Conduct training of private providers on TB management
2.5.6 Facilitate MoUs between private health facilities and PHAs
2.5.7 Ensure private health facilities are reporting to the NTP through the PHAs

Intervention 2.6 – Reduce stigma in the general population and among health care workers

Awareness of TB in the community and among health care workers to bridge knowledge gaps and health-seeking behaviour and thus improve access to TB services leading to early diagnosis and prompt initiation of treatment. A KAP survey will be conducted during this strategic plan and the findings and recommendations will be used to develop relevant IEC materials.

Activities

2.6.1 Develop a national advocacy and communication strategy on TB
2.6.2 Print and distribute IEC materials aimed at children with DS-TB, developed by the PNGPS
2.6.3 Conduct KAP survey to establish the baseline
2.6.4 Engage media program to disseminate TB messages
2.6.5 Conduct sensitization meeting for the media including journalists

Objective 3: By 2027, at least 90% of patients with TB tested and known their HIV status.

Intervention 3.1 – Provision of one-stop-shop integrated TB/HIV care at BMUs and ART centres

There is low coverage of HIV testing among TB patients because of stock-outs of HIV rapid diagnostic test kits. At the same time, the distribution of HIV test kits to TB clinics is inadequate. ART uptake among TB patients co-infected with HIV is low due to weak referral pathways. Sharing of information between the two programs occurs but it is ineffectual as it does not lead to improved collaborative TB/HIV activities. The focus in 2023-2027 will be first in the Highlands Region which has a high prevalence of TB and HIV, but all provinces will continue to get attention.

Activities

3.1.1 Update national TB/HIV guidelines and develop an operational manual on TB/HIV collaborative activities
3.1.2 Conduct regular National TB/HIV technical working group meetings at all levels
3.1.3 Establish one-stop-shop integrated TB/HIV services (group counselling, training, infrastructure improvement of high-volume TB clinics in the selected high burden provinces to accommodate HIV counseling and testing, reporting, selected ART centers upgrade to TB BMU and vice versa)
3.1.4 Develop SOP with referral algorithms on one-stop-shop services
3.1.5 Quantification of HIV diagnostic test kits for TB patients and adequate distribution to BMUs

3.1.6 Conduct joint TB/HIV training of health workers in BMUs and ART centres
3.1.7 Procurement and implementation of TB LAM for diagnosis of TB among PLHIV
3.1.8 Quarterly TB/HIV review at the provincial level
3.1.9 Biannual TB/HIV review at the national level
3.1.10 Joint consultations and sensitization on TB/HIV collaboration with PHAs including churches and community leaders
3.1.11 Patient support for TB/HIV co-infected patients (food vouchers; bus fares; psychosocial care)
3.1.12 Training of TB health workers on PICT and IMAI
3.1.13 Training of existing community volunteers on psychosocial counselling/care
3.1.14 Training and engagement of community treatment supporters for HIV counselling in the BMUs
3.1.15 Meeting for data review of the core TB/HIV indicators to improve data management and use for TB/HIV at all levels
3.1.16 Rollout of the unified reporting tool for TB/HIV indicators to improve data management and use for TB/HIV at all levels
3.1.17 Community Led monitoring roll out jointly with National HIV program

Intervention 3.2 – Intensified case finding among PLHIV

Introduce TB screening tool in all ART centres where PLHIV are enrolled in HIV care for intensified TB case finding. Clients with signs and symptoms suggestive of TB (presumptive TB) will have their sputum examined at the nearest health facility using GeneXpert. Depending on the situation, the patient will be referred to nearby BMU with GeneXpert instrument or sputum sample will be collected and sent for examination to a nearby BMU for GeneXpert testing.

Activities

3.2.1 Develop/revise screening tool for TB among PLHIV
3.2.2 Train health care workers in ART centres on TB case management
3.2.3 Train provincial TB and HIV coordinators on the use of TB screening tool among PLHIV
3.2.4 Conduct on-site training on the effective use of TB screening tools in ART centres
3.2.5 Diagnosis of TB among PLHIV at BMUs and / or ART centres with GeneXpert

Intervention 3.3 – Scale-up TB preventive treatment to all eligible PLHIV

Tuberculosis remains the leading cause of death among PLHIV. TB preventive treatment (TPT) is a critical intervention to reduce TB morbidity and mortality among PLHIV. To achieve the global targets of the End TB Strategy, there is a need for the implementation of TPT to address the significant reservoir of TB infection among PLHIV who are most likely to progress to TB disease.

Activities

3.3.1 Develop algorithms to rule out TB disease
3.3.2 Training of health care workers in ART centres on TB preventive treatment for PLHIV
3.3.3 Introduction and roll out of shorter TB preventive regimens for PLHIV
3.3.4 Develop and implement monitoring tools for TB preventive treatment

Intervention 3.4 – Improve TB infection prevention and control (IPC)

The NTP in collaboration with the HIV program will implement infection prevention and control measures in BMUs and ART centres as part of a health facility infection control plan.

Activities

3.4.1 Develop and disseminate TB infection prevention and control guidelines which include an annual screening of health workers for TB

3.4.2 Conduct training of healthcare workers in TB infection prevention and control

3.4.3 Develop SOPs for infection prevention and control (admin, environmental, PPE)

3.4.4 Procure personnel protective equipment (PPE) – surgical and N95 masks and distribute to all integrated health facilities (BMUs, ART centres)

Intervention 3.5 – Screen all children <5 years of age with TB for malnutrition

The mid-upper arm circumference (MUAC) is a quick and easy way to use measurement to rapidly diagnose malnutrition in children. Children with malnutrition are at higher risk of morbidity and mortality. Children identified with moderate or severe malnutrition should be monitored more closely and treated appropriately

Activities

3.5.1 Train staff how to perform MUAC on children < 5 years of age

3.5.2 Coordinate with NDoH Department of Nutrition so they may provide ready-to-use therapeutic (RUTF) feeds (Plumpy'Nut or Eezee paste) to BMU's as needed

Objective 4: By 2027, the technical and managerial capacities of the National TB Program at national, regional, provincial and district levels for the provision of quality TB services are strengthened.

Intervention 4.1 – Building capacity of the National TB Program at the central level

The NTP will maintain current program staff and recruit additional staff to fill positions in the organogram. External and internal leadership, technical and management training for program staff will be planned. The policy environment will be strengthened for effective national TB response.

Activities

4.1.1 Review and update NTP organizational structure, job descriptions

4.1.2 Retain current NTP staff plus recruit and support PSM, epidemiologist, childhood TB, M&E focal point at the NTP

4.1.3 Develop/update, print and disseminate national TB policy and guidelines

4.1.4 Support NTP staff to attend international meetings and training (UNION, RIT training, Vietnam training, TB fellowships, mentorships, MDR-TB, childhood TB, laboratory)

4.1.5 Support NTP staff to conduct operational research and present at the regional and global UNION or other conferences

4.1.6 Development of a training curriculum

4.1.7 Support annual TB symposium and NTP staff to attend the annual medical symposium

4.1.8 Training of NTP staff on project management, M&E and operational research

4.1.9 Conduct mid-term review of the National Strategic Plan for TB 2023-2027

4.1.10 Conduct validation workshop to build consensus on the national policy and guidelines

4.1.11 Support operational and administration costs of the NTP including communication (office equipment, computers, printers, internet access, 2 vehicles, stationery)

Intervention 4.2 – Strengthening surveillance, research and use of data for decision making

The NTP will introduce an electronic recording and reporting system, able to integrate into the eNHIS and paper-based system should be phased out. This will enable the NTP to closely monitor program activities. Operational research will be integrated into the program under the stewardship of the NTP. The NTP will conduct regular meetings (TB and TB/HIV TWG) and program reviews (mid and end-term) and the annual report will be written each year and distributed by March.

Activities

4.2.1 Update, print and distribution of NTP recording and reporting tools to reflect contribution of community / Private sector engagement in TB control activities
4.2.2 Roll-out of electronic recording and reporting system (e-TB module)
4.2.3 Training and mentoring on TB surveillance and R&R
4.2.4 Develop TORs for and establish TB Research Committee
4.2.5 Conduct regular meetings of the TB Research Committee
4.2.6 Conduct operational research and present at the regional and global UNION conferences
4.2.7 Introduce telemedicine in the national TB response
4.2.8 Conduct joint supportive supervision and monitoring to the provinces
4.2.9 Conduct annual data quality audit
4.2.10 Conduct external program review and
4.2.11 Conduct regional Greenlight committee (rGLC) reviews
4.2.12 Develop, print and dissemination of NTP annual report
4.2.13 Inclusion and linking of drug logistics and laboratory management systems with the case-based reporting system
4.2.14 Inclusion of SMS or video treatment or appropriate methods for patient retrieval in urban areas where almost 75% of the patients are and where 50% of patients use mobile phones
4.2.15 Develop PNG TB website
4.2.16 Conduct regular supervisory and M&E visits to provinces
4.2.17 Conduct TB prevalence survey

Intervention 4.3 – Strengthening capacity of PHAs for provision of quality TB services in the provinces

The recent decentralization reforms in the country mean that the national Government distributes funds to provinces for delivery of services and the provincial government will coordinate, facilitate and monitor the implementation of service delivery at the district level. In total there are 21 provincial health authorities (PHAs) in 22 provinces of PNG including the National Capital District.

Activities

4.3.1 PHAs to develop provincial TB response plans with support from the NTP and partners
4.3.2 Support training of TB coordinators with focus on coordination, supervision and reporting
4.3.3 Involvement of PHAs in activities that lead to continued capacity building like supervision, operational research; and PHAs taking the lead in managerial activities like engaging the

CBOs/FBOs, the private sector, ensuring the presence of trained health staff and working equipment in BMUs, assessment and relocation, where required, of diagnostic and treatment network, preferably in consultation with NTP

4.3.4 Conduct annual provincial multi-sectoral meetings for TB control by PHAs

4.3.5 Conduct quarterly TB/HIV coordination meeting at provincial level

4.3.6 Conduct provincial review and data verification meetings to be attended by NTP (use of data for prioritization, monitoring and decision making)

4.3.7 Support PHAs to attend international training and meetings to enhance their capacities

4.3.8 PHAs to supervise (monthly) BMU and non-BMU health facilities and monitor TB activities

4.3.9 Identification of priority topics and focal person for operational research.

4.3.10 Dissemination of program data to stakeholders thereby facilitating issue-based partnership

Intervention 4.4 – Improve government commitment and resource mobilization

To ensure sustainability, the NTP will proactively engage the government to increase the allocation of domestic funding for TB control, and coordination of partners for external funding. Each year, the TB program will organize sensitization meetings for senior government officials to put TB high on the agenda with a specific focus on mobilizing domestic resources for the procurement of anti-TB drugs, laboratory supplies and human resources. The NTP will commemorate the annual World TB Day with strong involvement of senior government officials and the media to advocate for national TB response.

Activities

4.4.1 Establish a multi-sectoral accountability framework for TB (MAF-TB) and organize sensitization and advocacy multi-sectoral meeting every year at the national and provincial level

4.4.2 Establish and support provincial community-based organizations (CBOs) for TB

4.4.3 Commemorate the annual World TB Days

4.4.4 Annual meeting between the NTP and partners for resource mobilization purposes

4.4.5 Conduct annual advocacy meeting with non-health sector (government-line ministries, private sector) to discuss the burden of TB in PNG

Intervention 4.5 – Reduce catastrophic cost among TB-affected households

The recent patient cost survey showed that 42% of TB-affected households had incurred catastrophic expenses covering medical and non-medical costs. TB patients suffer from social and financial consequences and lack of financial and social protection. TB patients who work in the informal sector with lower-income, less education, unemployment, DR-TB patients and delay in diagnosis were associated with an increased risk of catastrophic costs. The main social challenges of TB include losing work time, loss of job, employment, food insecurity, social exclusion and interrupted schooling.

Activities

4.5.1 Establish national multi-sectoral accountability mechanism (MAF-TB) within the 5 years

4.5.2 Engagement of all providers, civil society and community-based organizations in TB control

4.5.3 Use of innovative technologies (such as cargo drone) in hard to reach areas for early diagnosis and prompt initiation on treatment

4.5.4 Conduct targeted systematic screening and contract screening for TB in hard to reach areas

4.5.5 Provide financial and social support (food vouchers) to DS and DR-TB patients based on need

Issues common to all objectives

Training

With updated TB guidelines for diagnosis, treatment and prevention, and DR-TB based on WHO's recommendations, and with changes being proposed and implemented in the national practices, all health care workers will need training. Towards this end, the following is being considered:

- Update training manuals for various cadres in 2023. Training will be skill-based and include role plays for inter-personal skills, updated reporting formats, referral pathways for diagnosis and treatment, use of locally generated data for all staff, and managerial/supervision component for the national and provincial staff.
- Train the provincial level staff – PDCOs and TB/HIV coordinators in 2023.
- Starting in 2023, provinces can start their training – starting with urban areas.
- The venue of training activities will be considered at the district level or at the health facility level. Different cadres of staff will be trained together so that the team approach with each person knowing his or her role for the patient-centric care can be clarified for all.
- Staff will have their training manuals or job aides which they can keep for future reference.
- Training on FNAB procedure to be emphasized for EPTB cases (ie TB Lymph Node).

Monitoring, supervision and evaluation of the TB program

The period 2023 – 2027 has renewed focus on some program components; 1) decentralization to PHAs, 2) new guidelines to include universal DST and updated treatment guidance, 3) Community engagement and 4) private sector engagement. There is going to be a focus on improving the treatment outcomes, specifically to decrease the 'loss to follow-up' and 'not evaluated' outcomes. Hence, training and M&E for TB control will play a vital role in making it a successful program.

Following elements are being considered;

1. Indicators are being updated to reflect the updated definitions as per WHO guidance.
2. Updating of BMU monitoring forms that are submitted by the BMU to the central and provincial levels every quarter to have the new and updated program indicators and definitions
3. Training on the updated monitoring forms as part of general TB training
4. TB/HIV or TB coordinators placed at the provincial level will be trained first in the new TB care guidelines as well as the M&E manual. PDCOs and coordinators will be the key technical personnel to take forward the training in their respective provinces for the new TB care guidelines
5. Coordinators and PDCOs will be the key positions responsible for quality of data, the quality of services and timely and complete reporting from BMUs.
6. For the quality of data and services, triangulation of records and verification with patients interviewed at facilities and at home will be important.
7. e-NHIS and eTB module are being rolled out in the entire country. Eight provinces are considered to be fully digitized with tablets available for the health workers at the peripheral level. Other provinces have data entry provisions from the paper reports at the provincial level.
8. Supervision from Provinces will ensure that all BMUs and at least half of all health facilities that are not BMU are covered every quarter. Supervision from the national level will ensure that all provinces are visited every quarter to coincide with the quarterly review meetings.

9. The focus is first on achieving a treatment success rate of at least 85% thereby closing the tap on MDR-TB. Thus, the focus will first be on high volume BMUs.
10. Yearly national level evaluations –A protocol can be developed and a few BMUs visited as an exercise for about a week – 2-4 times a year starting from 2022. This can provide an opportunity for joint learning and cross-sharing of experiences across provinces and across partners.
11. The mid-term review can be held in early 2025 with external partners to evaluate the program outcomes with new partnerships especially community and private sector engagement.
12. Operations research;
    a. Program data can be used to generate and answer some questions related to better care.
    b. For estimating the burden of disease - the country can plan to do active case finding in selected communities in urban and rural areas as per an agreed methodology.
13. The private sector contribution to the case finding and treatment needs to be studied carefully and systematically. Anecdotally, around 50 clinics are expected to be seeing patients to a varying degree in Port Moresby. Sectors for Mining, oil and gas, and shipping are big in PNG and have their own health facilities for their employees and sometimes for the surrounding general population, in almost all provinces. Many of them have a partnership with local public health facilities. This partnership needs to be studied for TB care. The plan is to enumerate private sector facilities and understand the feasibility of engagement with NTP in 2023 in NCD and use this as a template for studying other provinces in 2023-2027.

Indicators

Indicators pertaining to all activities with their targets are listed in Appendix 8.

Assumptions for targets

The focus of the program, at least in the initial 2-3 years should be on improving the treatment adherence to improve the treatment outcomes to thereby prevent MDR-TB in the community. The following assumptions were made to achieve the NSP targets-

It is assumed that with the incidence of 424 per 100,000 and a population of 10 million, the number of cases in 2021 was 30,200 and in 2022 was 36,070. The final target for 2027 is reaching 90% of the total expected number of cases considering the rate of population growth to be constant and a prevalence rate to be constant till 2027.

It is assumed that community engagement as seen in NCD will be scaled up to other provinces as planned in the NSP and that it will lead to increase in TB case notification because of– a) increase in the number of presumptive cases referred, b) increased testing of presumptive cases, c) increase in contact investigation and d) improved sputum transfer or incentivized patient transfer for testing.

Increase in case notification will also result because of e) Xpert® MTB/RIF will become the first diagnostic test for the majority of the patients, and f) appropriate training of all staff in the country will help in identification of more number of presumptive cases in the out-patient departments and increased referrals for testing.

Community engagement and Childhood TB project are also expected to result in improved quality of diagnosis because of; a) decrease in the number of patients with sputum not done or not available, b) improved access to Xpert® MTB/RIF, c) training for stool test, gastric aspirate, lymph node aspiration.

Active case finding other than in the three hot spots will be done in Y3 to Y5 – after a mid-term review of the program. Active case finding target should include prison populations from year one.

Risks

The anticipated risks for not achieving the successful treatment outcome and case notification rates as per the targets are as follows-

1. Community engagement is not scaled up as planned. Engagement of CBOs/FBOs and CVs as CTS could be jeopardized if – a) the schemes for engaging them is delayed by the NTP/national level because of various factors including lack of consensus on the methodology for scale-up or involvement of international NGOs or initial preparatory activities, b) PHAs delay in engaging the CBOs/FBOs, c) supervision and support is not provided to the CBOs/FBOs who are engaged for this activity for the first time, d) CBOs/FBOs themselves take more time than anticipated in initiating the activities or in being as efficient and as result-oriented as the initial experience in NCD province, e) funding mechanism is not streamlined, f) other unanticipated factors.
2. Sputum transportation continues to be challenging- A major challenge for universal DST is that the 64 GeneXpert sites performing Xpert® MTB/RIF testing are fewer than the 252 BMUs or the 123 functional AFB microscopy sites. This will be jeopardized if - a) CBOs/FBOs/CVs are not identified in time for this activity, b) incentives are not secured or too small c) there is a delay in transportation compromising the integrity of the specimen.
3. Mortality could worsen if TB patients become vulnerable due to external factors some of which are – a) deterioration in the performance of the HIV program, b) increased HIV drug resistance, c) increase in the prevalence of or poor control of diabetes, d) increasing malnutrition in children.
4. Decentralization to the PHAs is jeopardized. At provincial level, highest risk is lack of PHA commitment to TB control. The implementation of this strategic plan will be at risk if a) NTP is not able to build the technical capacity of PHAs, b) there is a delay in PHAs assuming responsibility. This could be reflected by lack of formulating a provincial level TB plan considering the local health infrastructure and local TB control, lack of adequate staff at the provincial level, lack of a provincial-level public health lab, lack of supervision and data analysis at the provincial-level; c) PHAs are not able to effectively coordinate inter-sectoral partners or the TB/HIV programs or the CBOs/FBOs engagement at the provincial level and d0 lack of technical assistance (TA) to guide the NTP.
5. CPHL doesn't decentralize and provincial level reference laboratories are not strengthened. It is important that intermediate laboratories at the provincial-level are identified to carry out the function of external quality assurance and supervision. Delay in these results is a risk to the quality of diagnosis and follow up for the TB patients.

Efficiencies in NSP

There are some important strengthening measures for the health system in PNG. Some of these are related to 1) health workforce, 2) health infrastructure related to health facilities, drug procurement, storage and distribution, laboratory system, and electronic health information system, and 3) strengthening of a community volunteer system rooted in the villages. The NTP will exploit these strengths in the health system and desist from duplicating.

Similarly, TB and HIV programs are expected to share resources like Xpert® MTB/RIF and have multi-disease platforms, consider the integration of services for CBOs/FBOs, consider the integration of messaging to the health staff and to the general community, and integrate training as appropriate.

One specific area for efficiency in TB service delivery is training. The TB NSP 2023-27 will require training that covers not just the technical component but also includes messages for the health workers to motivate them as to why TB control is important in PNG and why the urgency. This will be a sizeable budget, but the costs can be brought down if training is decentralized appropriately after the identification of a suitable trainer of trainers and trainers.

Financial requirement

Objective wise from finance section

Funding gap

From the finance section

Appendices

Appendix 1: Overview of Papua New Guinea

Papua New Guinea (PNG) occupies the eastern half of the island of New Guinea and is the largest country of the Pacific region and is 461,690 km² in size[4]. It is one of the most culturally diverse countries in the world with over 800 languages and over 1,000 distinct ethnic groups[5]. In 2021, the population was estimated to be around 10 million.

Demographically, PNG has a young population. About 35.6% are children less than 15 years and 78.9% are less than 40 years of age (figure 8)[6]. The average annual growth rate was 3.1%[7]. The average life expectancy at birth has been increasing over the recent years and was estimated to be 65.7 years in 2017[1]. Sadly, the under-5 child mortality remains high at 49 deaths per 1,000 live births of which 67% of these deaths occur in the first year[8]. Total fertility is also high at a rate of 4.2 and the average household size is 5.3 persons. The demographic characteristics differ between rural and urban communities.

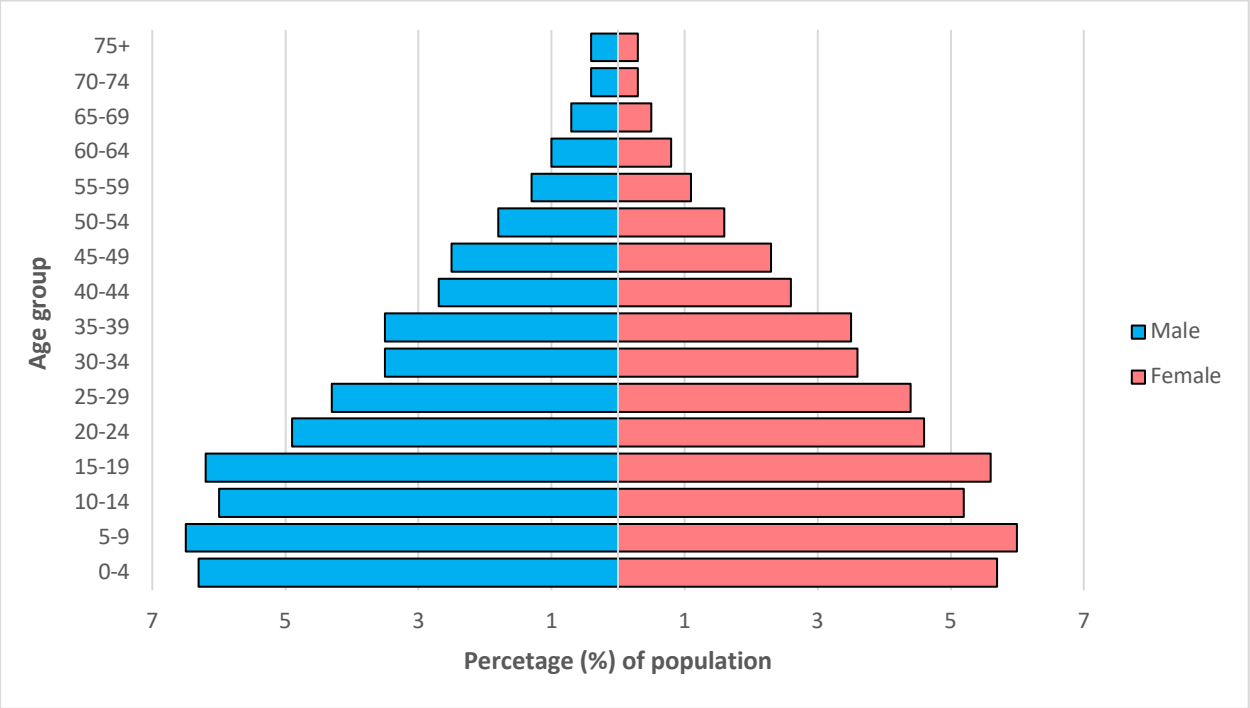


Figure 4: Population pyramid for Papua New Guinea, 2018

PNG is divided into four geographic regions namely Highlands, Momase, New Guinea Islands and Southern. These regions are administratively further divided into 22 provinces and 89 districts. About 39% of the population live in the Highlands region followed by the Momase region with 26% while Southern and Island regions make up 20% and 15% respectively. Of the 22 provinces, Morobe province alone contains almost 9.3% of the country's total population, reporting a total population count of 674, 810 people in 2011 Census. The Eastern Highlands and the Southern Highlands are the other two most populated provinces with a population in excess of half a million (figure 9). The capital city, Port Moresby, is in the province called National Capital District (NCD) and has a population of around 420,000 people.

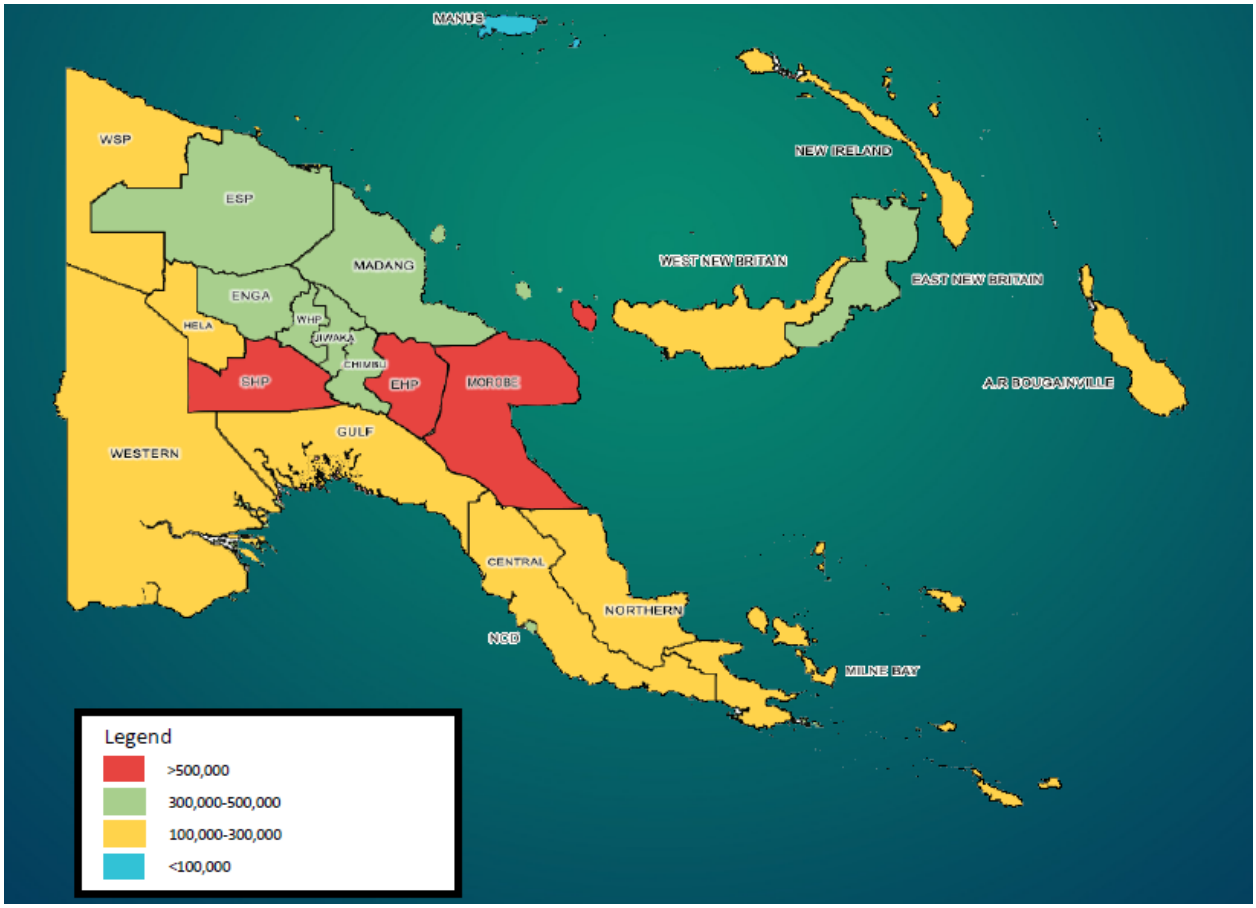


Figure 5: Map of Papua New Guinea showing the size of the populations for the 22 provinces

About 85% of people in PNG reside in rural areas[9]. Access in such places is very limited with only 68% living within 2 kilometres of an all-weather road. Similarly, mobile phone and internet coverage is still low with only 47.6 mobile cellular subscriptions per 100 people[10]. Only 7% of the population has access to the electric grid and a reticulated water system, and two-fifths of health/sub-health centres and rural health posts have no electricity or essential medical equipment.

Appendix 2: Structure of the health system

The PNG national health system is a decentralized model based on the Primary Health Care approach. The network consists of 1800 community-level facilities and approximately 800 sub-health/health centres. The secondary health-care level consists of 22 provincial hospitals, one of which is also the national referral hospital. The Government and churches are the main providers of health services; both are funded by the Government.

In 2017, the Health Minister called for a nationwide rollout of the PHA model across all provinces. The church health service providers play a prominent role in the delivery of rural primary health care services and operate over 50% of the rural health service network.

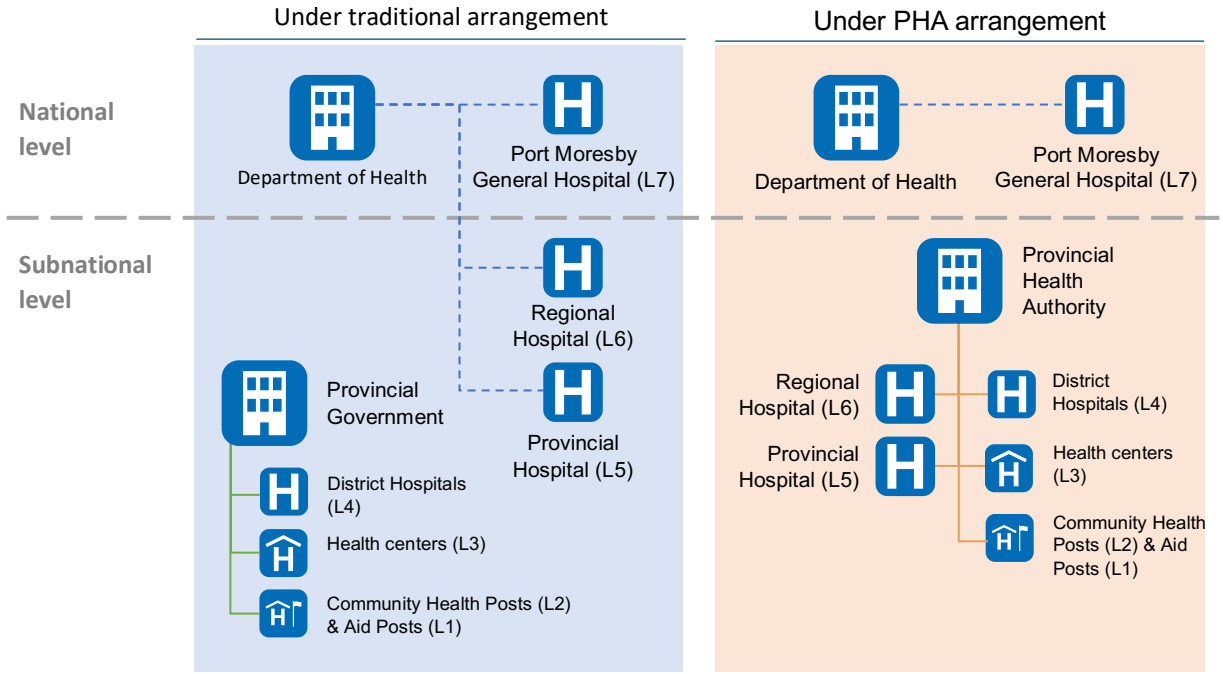


Figure 6: Simplified Illustration of a Decentralized Government Health Sector Organization (L= level

The National Health Services Standards (NHSS) of PNG has sent out an essential package of health services to be delivered at each level, with minimum standards for health facility infrastructure, staffing needs, standard equipment lists and a health service accreditation program.

As part of the roll-out of the NHSS, the 'Health Workforce Standards & Monitoring System (HWSMS)' was developed based on the World Health Organization's Workload Indicator Staffing Need (WISN) Methodology. There is a two-fold vision: (1) to optimize the available health workforce by reviewing the current deployment of staff based on the actual workload; and (2) to determine the health workforce requirements based on the service functions outlined in the NHSS. The workload data for the health facilities are extracted from the National Health Information System (NHIS) and the HR data is collated from the centralized PNG Health Human Resource Information database.

This tool will help support Provinces and NDoH in health workforce optimization as well as planning and ensure each health facility has equitably distributed human resources.The results generated from the HWSMS will be compiled in a report by Province and at the National level. The Provinces will be guided to use the HWSMS for the development of the 5-year health workforce plans in line with their respective Health Service plans and NHSS in order to determine the required skill-mix of the health workforce at all the levels of health facilities.

Appendix 3 - Organization of the National TB program

The National Tuberculosis program (NTP) in PNG is organised into three levels. There is the central level housed at the National Department of Health (NDoH); the provincial level, managed by the provincial health authority (PHA); and the basic management unit (BMU). Each of these three levels has specific roles and responsibilities.

National level

The NTP comes under the overall mandate of the Deputy Secretary National Health Service Standards within the Public Health Division. Functions are formally specified for the province, district and health facility levels in the NTP guidelines[11]. The TB Unit of the National Department of Health (NDoH) has ten staff under the leadership of the NTP manager (two senior medical officers, four officers with regional responsibilities, three monitoring and evaluation officers, one training officer and one clerk).

The central NTP is mainly responsible for policy formulation; development of national guidelines and overall management of the NTP. The program is located on the same floor with the HIV/AIDS & STIs program and they both report to the Manager of Disease Control and Surveillance branch of NDoH. S/he, in turn, reports to the Executive Manager of the Public Health who in turn reports to the Deputy Secretary on National Health Services Standards (NHSS). The Deputy Secretary on NHSS together with Deputy Secretary on National Health Planning and Corporate Services (NHP and CS) reports to the Secretary of Health.

The NTP manager is mandated by the government to lead the national response to end the TB epidemic. The national level's role is to formulate policy, regulation, technical oversight and coordination of the program. Working directly under the NTP manager are two senior medical officers (1 position currently vacant) that supervise four regional medical officers (1 position currently vacant). The government also supports a training officer, one M&E officer and one administration officer. Of the 13 allocated staff for the NTP, only eight (62%) of the positions have been filled and supported by NDoH since 2016. To address this gap, the NTP is also supported by two staff funded by Global Fund (1 Childhood TB officer, 2 medical officers responsible for TB laboratory and regions & 1 Epidemiologist)(figure 11).

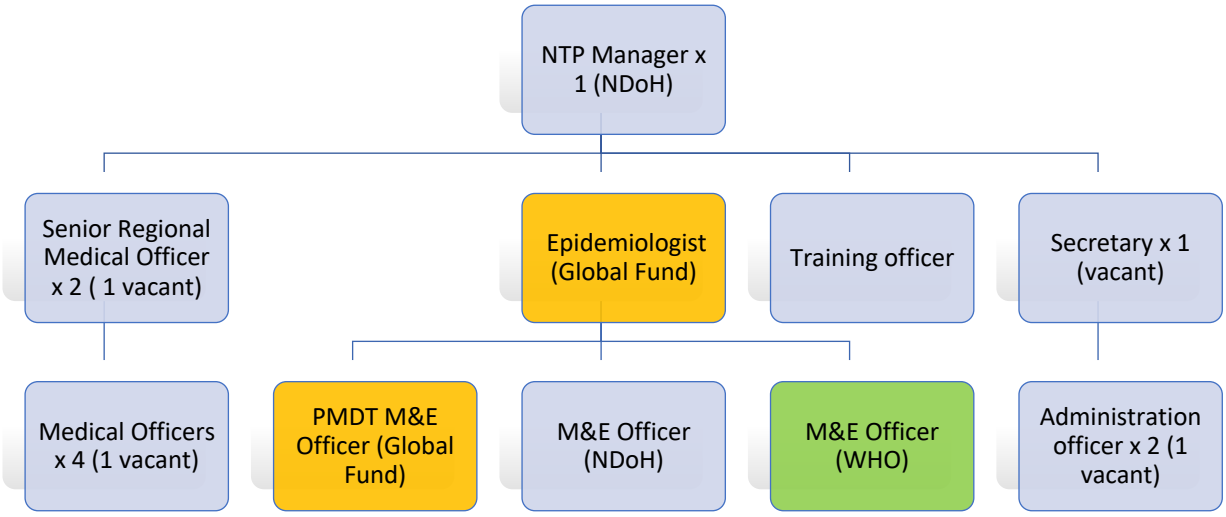


Figure 7: NTP organizational structure

Provincial level

Under the Provincial Health Authority, the PHA Chief Executive Officer is responsible for the programmatic management of TB activities in the province. They receive technical guidelines, standards operating procedures (SOPs) and report to the central level NTP at NDoH. Most PHAs have either a small team of government staff or a specified TB coordinator. In addition, TB/HIV coordinators have been appointed in 11 provinces; their salaries are financially supported through the ongoing Global Fund grant.

In the province, the Provincial Disease Control Officer (PDCO) is tasked to oversee the TB control program activities along with other communicable diseases and they report to Provincial Health Advisors provide that oversight at this level (figure 12).

In eight provinces; namely NCD, Western Highland, Southern Highland, Eastern Highlands, Morobe, East New Britain, West Sepik Province and Madang, there are government paid Provincial TB Coordinators that support the PDCO in coordinating TB services including M&E. In addition, 11 provinces, there are Provincial TB/HIV Coordinators funded by Global Fund that provide additional support the PDCO in the day-to-day functions. Western Province, Gulf and NCD are supported through Emergency TB Response and partly ETP.

While there are similarities in the structure of the TB program at the PHA level, subtle differences exist to cater to the specific needs of each province. This is the reason why some provinces have both a TB coordinator and a Provincial TB/HIV coordinator supported by Global Fund. Most provinces do not have district TB coordinators while others do not. The overall aim is to ensure that the program optimizes coordination of TB service delivery and M&E at this level.

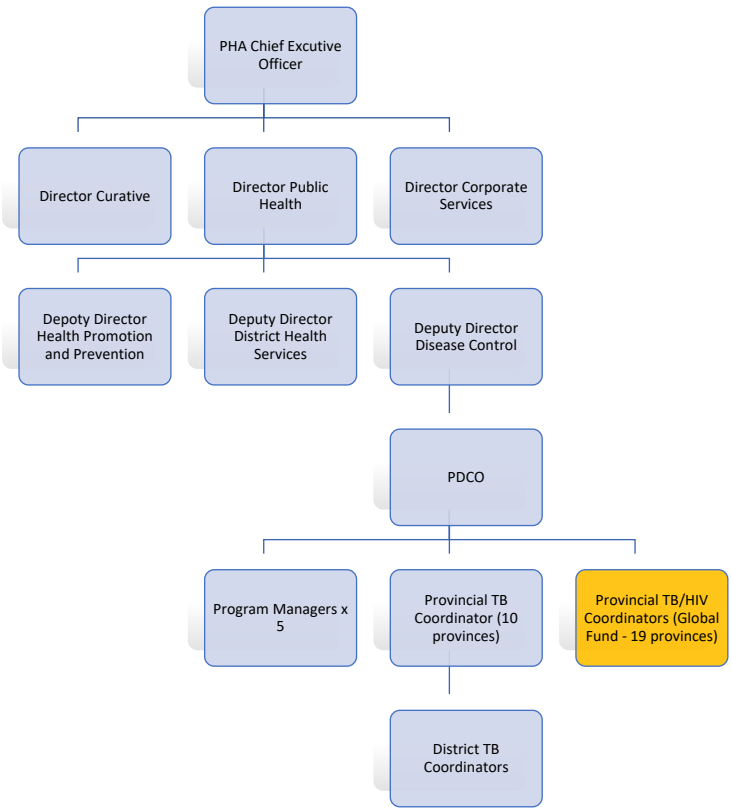


Figure 8: Structure of the TB program at the PHA

Basic Management Unit

The Basic Management Unit (BMU) is the most peripheral level of the TB program and there are currently 252 of them in the country. This is people access services for the prevention, diagnosis, care and treatment of TB. The BMUs are situated within health facilities, including hospitals, health centres, and community health posts. BMUs have at least 1 health staff (often a community health worker (CHW)) or a health extension officer (HEO) specifically assigned to carry out TB activities. For some BMUs, there is a dedicated TB nurse that is responsible for all that and reports to the Officer in Charge (OIC). However, most facilities do not have them in place. In addition, they are supported by laboratory personal the conduct Direct Smear Microscopy and/or Xpert® MTB/RIF. In two provinces implementing the Emergency TB Response (ETR), NCD and Western BMUs also work closely with TB treatment supporters. These are members of the community nominated to provide incentivized volunteer services to support the BMU in identifying presumptive TB cases, supervising patients while on treatment, contact tracing and following-up on patients lost-to-follow-up (LTFU).

Table 2: Number of BMUs in each province

Province	Number of BMUs
Chimbu	8
EHP	11
SHP	10
WHP	8
Jiwaka	4
Hela	1
Enga	5
Madang	10
Morobe	31
WSP	11
ESP	16
Central	11
Milne Bay	22
Oro	9
NCD	14
Gulf	10
Western	5
ARoB	30
Manus	3
WNB	9
ENB	14
New Ireland	10
Total	**252**

Appendix 4: Challenges and Recommendations noted by the Joint External Review, May 2019

Challenges

1. Human resources of Provincial Health Authority (PHA) are insufficient. There is rapid turnover of trained staff, and a lack of succession planning and structured training plan for new staff.
2. Inconsistencies between TB register and quarterly reports, and between provincial and NTP data were noted. BMU staff lack competencies needed for accurate reporting.
3. GeneXpert instruments are underutilized. Drug susceptibility testing (DST) have not yet been established. Transportation of specimens and recording and reporting at all levels are weak.
4. Health workers at BMUs have been insufficiently trained. The proportion of bacteriologically confirmed pulmonary TB was low (<20%) and that of extra pulmonary TB high (≥40%).
5. In 2016, the proportion of TB cases with treatment success was 62%, and that of loss-to-follow-up/not-evaluated was high. Engagement of sub-health centres and community workers is limited.
6. Coordination of PMDT remains centralized at national level. The proportion of MDR/RR-TB with treatment success was 68% in 2015 with substantial loss-to-follow-up.
7. Childhood TB accounts for a relatively high proportion of notified TB cases (24% - 54%), likely indicating substantial over-diagnosis .
8. Supply of HIV test kits was irregular, resulting in insufficient HIV testing among TB patients. Lack of HIV/TB coordination meetings.

Recommendations

1. NTP (Regional TB Medical officers) & PHA (Director of Public Health) should specify minimum staffing requirement; link to provincial operational/investment plan in line with NSP: recruit staff in an innovative way; formulate training plan for new and existing staff; community treatment supporter system (volunteers) with linkage between NGO & district/provincial health facilities.
2. Provincial TB coordinators should ensure timely submission of accurate reporting of drug susceptible TB through regular monitoring and supervision of BMUs; NTP should ensure that PMDT sites will be trained and supervised for regular reporting of PMDT data.
3. CPHL should be engaged to help develop provincial TB laboratory operational plan to ensure capacity and quality of laboratory service; specimen collection and transportation systems should be strengthened; Identify laboratory coordinators at provincial levels; use available technologies to reduce turnaround time; CPHL should finalize the establishment of culture and DST.
4. Health workers at OPD should be trained and supervised for the identification and management of presumptive TB cases; national guidelines must be made available at BMUs.
5. TB treatment should be integrated in all health facilities. Initiatives involving treatment supporters for DOT should be extended. NGOs operating in the communities need to be engaged; treatment outcomes must be evaluated in quarterly meetings at all levels.
6. NTP should develop a national PMDT transition plan to strengthen the capacity of provincial team and BMUs. Treatment interruption of MDR/RR-TB should be addressed effectively.
7. NTP should appoint a focal person of childhood TB to undertake capacity building; childhood TB protocol should be updated through the support of Pediatric Society. Job aid on childhood TB for health extension officers and community health workers should be developed.
8. Set-up a paper-based management system with simple guidelines covering storage, medicine management, reporting and ordering. Train and supervise. Then, roll out an electronic Logistic Management Information System for TB medicines (m-Supply for example), but keep the paper-based system as a back-up.

Appendix 5 – Summary of Findings and Recommendations from 2023 Desk Epi-review

Summary Findings

TB continues to be a major public health problem in the Papua New Guinea. It is estimated that in 2021 42,000 fell ill with TB and nearly 5,100 died of it. Despite numerous challenges because of COVID-19 pandemic, Papua New Guinea made a remarkable progress in the following areas:

- Improved TB surveillance and service delivery,
- Increased diagnostic sites equipped with GeneXpert,
- Increased number and percentage of notified bacteriologically confirmed cases,
- Improved HIV testing coverage,
- Improved anti-retroviral treatment coverage
- Good treatment success rate among RR-TB in Papua New Guinea exceeding global and regional average.,

The gaps in the programme are big:

- In 2021 health systems in Papua New Guinea detected and notified 28,873 people with active TB, which makes only 69% of estimated number of TB cases,
- Massive number of notified active TB cases without laboratory testing,
- Unusually high percentage of childhood TB in several provinces,
- Unusually high percentage of extra-pulmonary TB in some provinces,
- Excessive year to year variation of notified TB cases at sub-national and national levels,
- Dis-aggregated by site of disease, bacteriological confirmation, history of treatment, large number of lost to follow-up combined with low proportion of previously treated cases – all those observations are indications of possible over-diagnosis among notified cases.
- On the other hand, consistent high percentage of positivity among those tested, across all setting, strong correction between testing and notification across the provinces health system misses considerable number of people being diagnosed. In addition, over-population of TB cases among young age groups and children hints there is an ongoing high rate of transmission of disease in the general population.
- Ability of TB surveillance system to notify all diagnosed TB cases is somewhat limited because of incomplete reporting from service delivery points as well as because of failure to include detected RR-TB cases into total number of notified TB cases.

Recommendations

Strengthen recording, reporting system

- Establish one consolidated data collection system for all TB cases notified in the country, which should include all diagnosed TB cases: confirmed RS-TB, confirmed RR-TB, clinically diagnosed and those with unknown drug-resistance. Primary RR-TB cases should be included into overall notification to ensure accurate counting of diagnosed TB cases and other programmatic indicators. Immediately discontinue the practice of “DS-TB database”.

- National manual, paper and electronic data collection tools, standard reports need to be updated in-line with WHO recently released updates1,2 of definition frameworks followed by cascade training of all care providers involved in TB data capture and reporting at all levels.
- Importantly, while revising reporting forms (notification, treatment outcome), avoid un-necessary dis-aggregations and inflating number of data fields to be collected. Discuss necessary customizations with field experts before introducing them. Seek technical support from WHO CO.
- Update the content of reporting forms to ensure that all relevant NSP indicators expected to be collected from routine surveillance are collected using standard reporting forms. Specifically, ensure that reporting forms have designated fields for computing the number WRD testing among newly diagnosed TB patients, contact tracing among adult household contacts, TPT completion etc.
- While collecting data in excel forms from facility levels, introduce basic validation checks to ensure that fields where only numeric values are expected, are restricted to integers only and characters or symbols are not possible to enter. In addition, consider introduce validation across related fields such number of new and relapse cases is equal to number new and relapse cases, number enrolled into ART is lower than number HIV positive TB cases etc.
- Safeguard historical data into one single tidy consolidated database to allow time-series analysis and visualization at all levels. Database should be cleaned, un-necessary variables to be dropped, un-necessary dis-aggregations merged, variables re-named according to WHO convention. Alternatively, consider to introduce aggregated DHSI2 as reporting system at province level and at districts and BMUs that have the capacity and infrastructure.

Improve completeness of reporting

- All health facilities and health services providers providing TB diagnostic and treatment services should report TB program. Conduct mapping of all health facilities that provide TB diagnostic and treatment services and keep the list updated
- Regularly analyze and report the completeness of data reporting versus expected. Actively provide feedback to require quarterly report at each of supervisory level.

Improve the quality of TB diagnosis

- Ensure that all presumptive TB cases are tested for TB. Low level of bacteriological confirmation indicates overdependence on clinical diagnosis and potentially over-diagnosis. When the proportion of bacteriological confirmation is below 50%, the validity of clinical diagnosis is warranted (e.g. via implementation of clinical audit).
- Special attention is required for childhood TB, as some provinces report exceptionally high proportion of cases among children, which most likely is the result of over-diagnosis. To understand the level of adherence of diagnostic algorithm and issues related to over-diagnosis, NTP might implement retrospective clinical audit of child TB, extrapulmonary TB and clinically diagnosed cases.
- Assess the possible reasons of low utilization of Xpert machines. Discuss, plan and implement remedial action to increase the Xpert utilization.

Improve drug-resistance surveillance

[1] Meeting report of the WHO expert consultation on the definition of extensively drug-resistant tuberculosis, 27-29 October 2020. Geneva: World Health Organization; 2021. CC BY-NC-SA 3.0 IGO

[2] Meeting report of the WHO expert consultation on the definition of extensively drug-resistant tuberculosis, 27-29 October 2020. Geneva: World Health Organization; 2021.

- Improve routine drug-resistance surveillance system: this should include increased WRD testing coverage, revision of design of BMU TB register, smooth timely data exchange between laboratories and BMUs, completeness DST data in the BMU TB register, revision of block 5A and block 5B in reporting forms. Discontinue the practice of dis-aggregating presumptive TB cases by DS and DR pattern. It would be much easier to compute routine-drug resistance surveillance data based on BMU TB register, rather than from the laboratory registers, as laboratory registers serve several BMUs and it is not excluded that one patient might be tested more than once by various methods in several laboratories.

Improve TB-HIV surveillance

- To ensure that surveillance data provide direct measure of the prevalence of HIV TB cases, expand HIV testing and document the results to reach high (at least 80%) coverage nationally.
- Improve TB preventive treatment among PLHIV newly enrolled in ART.

TB treatment

- High rate of lost to follow-up among new and relapse, RR-TB and TB/HIV patients might hint that currently provided model of care in PNG is not enough patient-centred and is not responsive to individual patient preferences. A package of treatment adherence interventions may be offered for patients on TB treatment (patient education, communication, material support, psychosocial support) in conjunction with the selection of a suitable treatment administration options (such as decentralized model of care for DS, MDR-TB and TB/HIV patient, engagement of community health care providers, treatment supporters to support treatment adherence and track those who interrupt the treatment.
- Avoid un-necessary dis-aggregations in reporting TB treatment outcome data to improve the quality and validity of reports and support smooth analysis and decision making at all levels.

Contact tracing and preventive TB treatment

- Set targets for contact tracing and TPT at national and province levels and monitor progress against the targets. Update national guidelines of TPT in line with most recent WHO recommendations. Implement routine contact tracing of all household or close contacts for BC PTB cases, including source case finding for children.

Appendix 6: Structure of the central and peripheral TB laboratory network

TB laboratory structure and network

The TB laboratory network in PNG consists of the Central Public Health Laboratory (CPHL), microscopy and/or Xpert® MTB/RIF laboratories at provincial & district levels and microscopy laboratories at health centres. A National TB laboratory strategic plan has been developed which is a roadmap for resource mobilization and allocation.

Central public health laboratory

CPHL is a branch of the Public Health Division of the NDOH. TB and EQA are sections of the CPHL. CPHL coordinates external quality assessment (EQA), supervision, monitoring and training, service and maintenance of the GeneXpert instruments, and revising guidelines and SOPs. CPHL collaborates closely with the Queensland Mycobacterium Reference Laboratory (QMRL), Brisbane that serves as the WHO Supranational TB Reference Laboratory (SRL) for PNG. The QMRL supports CPHL in performing first- and second- line phenotypic drug susceptibility testing (DST). It also provides test panels for EQA of smear microscopy.

There are at present one Officer in Charge and two Medical Laboratory Technicians/scientists (MLT/MLS) working at TB unit of CPHL. Two additional scientists were recruited in 2019 by WHO to support the TB section.

Culture, phenotypic drug-susceptibility testing and line probe assay

There is a Biosafety Level 3 (BSL3) laboratory at the CPHL and has the capacity to perform both solid and liquid culture. The CPHL provides culture services for the entire TB laboratory network; a mobile sterilizer is currently used to replace the pass-through autoclave. Validation of First and second-line DST was completed in 2019. During 2018, 222/432 (51.4%) MTB Complex detected with 1.4% of contamination rate. In 2018, second-line LPA was performed on 376 MDR cases in which 5.1% (19/376) were fluoroquinolone resistance compared to 5.7% (19/331) in 2017.

Xpert® MTB/RIF network

The number of Xpert® MTB/RIF testing sites increased from 2 in 2012 to 64 Xpert® MTB/RIF sites in 2022. The number of Xpert® MTB/RIF tests increased from 11,319 in 2016 to 30,493 in 2018 (3.8 Xpert® MTB/RIF tests/site/instrument/day). Testing algorithm including Xpert® MTB/RIF test has been developed.

TB microscopy network

The previous national strategic plan for TB control in PNG indicated 139 established microscopy laboratories in the country spread over the 252 basic medical units (BMUs).
According to the NTP last updated data (22/1/2019), of the 139 established microscopy laboratories, 95(68.4%) were functional, implying that 34.5% of **252** BMUs had functional microscopy. In some provinces and districts, the microscopy-to-population ratio is as low as 1:400,000 (East Sepik, Bougainville, Simbu, etc.)

Quality assurance

In 2016 and 2017, the proportion of laboratories participated in EQA was 53.2% and 53.0% respectively, and acceptable performance varied between 61.1% and 83.9%. In 2018, only 70/123 (56.9%) sites participated in blinded slide rechecking with a performance score of around 72.7%.

Laboratory infrastructure and facilities

The CPHL does not have the infrastructure, nor staff to accommodate a well-functioning TB reference laboratory. To ensure minimum safety requirements of the laboratories, strong advocacy from NDoH, NTP, CPHL is needed. There have been discussions about the CPHL moving into a new fully functional Public Health Laboratory, with enough space for TB; or, establishment of a separate, stand-alone National TB Reference.

Sample collection, referral and transportation system

CPHL is the only laboratory undertaking TB culture and DST. All PNG TB laboratories refer samples to CPHL. Hospitals and health centres send samples to Xpert® MTB/RIF sites and/or microscopy sites. To strengthen sputum transportation, CHWs, health centres, district and provincial staff or private couriers need to be trained and supervised. For children, gastric aspiration (with available naso-gastric tubes in appropriate sizes) should be scaled up

Equipment maintenance and certification

Personnel at CPHL have been trained in calibrating as well as replacing GeneXpert modules. Most of the biosafety cabinets are not regularly serviced and certified. Modules require replacement when they fail calibration or when errors indicate a faulty module.

Challenges

1. Limited funds and weak or lack of leadership, coordination and management,
2. The GxAlert system is functional throughout the Xpert® MTB/RIF testing sites, however, the result reporting function is not connected optimally to the health care workers or clinicians.
3. Xpert® MTB/RIF utilization rate is very low (3-4 tests/day/site).
4. The number of functional TB microscopy laboratories decreased since 2014.
5. Some of the private sector laboratories perform TB diagnostic tests without quality assurance.
6. No microscopy site is equipped with light-emitting fluorescence microscopy (LED-FM) technology.
7. Participation in EQA activities has been consistently poor.
8. Long turn-around time of microscopy and Xpert® MTB/RIF test results at some sites.
9. Limited laboratory staff accountability while training, supervision and on-site training are irregular.
10. A high number of samples are not sent to CPHL for culture.
11. Delays in replacing GeneXpert modules; calibration and maintenance of GeneXpert instruments.

Provincial TB laboratories need strengthening to carry out TB laboratory work, trainings, supervision and monitoring, samples transportation system, EQA programme, Xpert® MTB/RIF and microscopy networks. The provincial laboratories and MCs are in need of upgrading the infrastructure and increase training of human resources.

GeneXpert® MTB/RIF in PNG – numbers, performance and expansion plan

The number of Xpert® MTB/RIF testing sites was 23 in 2017, 28 in 2018, and increased to 33 in 2019 and 64 in 2021. The number of Xpert® MTB/RIF tests performed was 16,752 in 2017, increased to 30,493 in 2018 (figure 14).

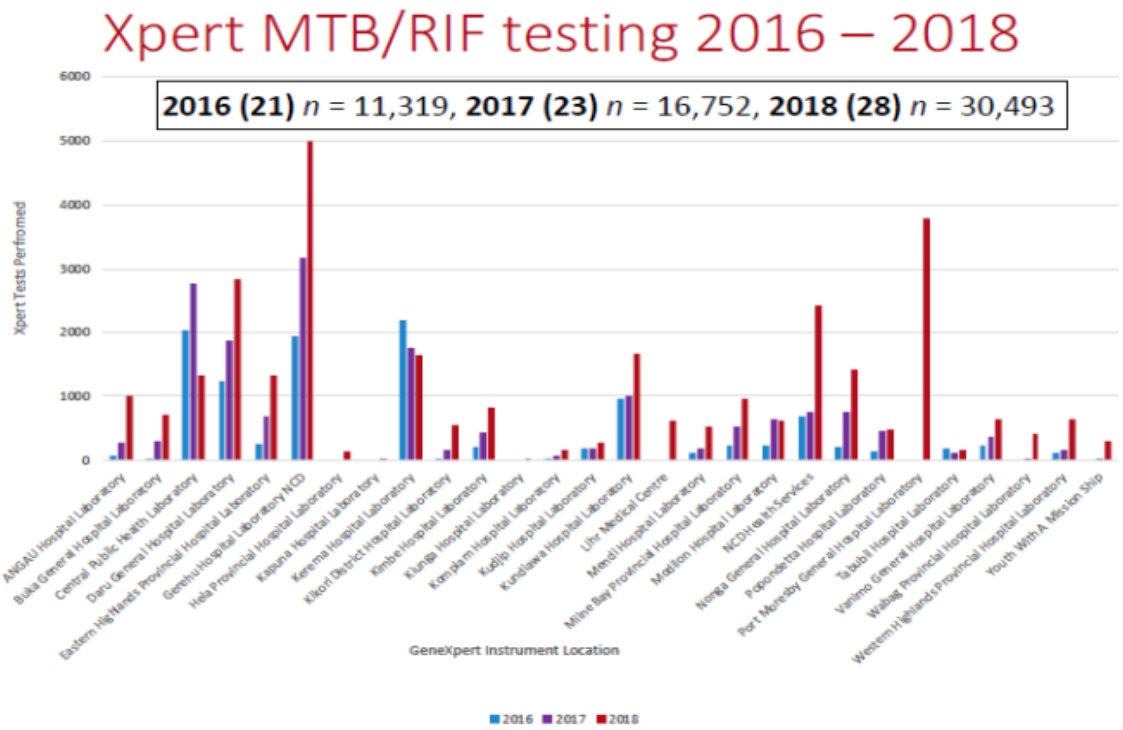


Figure 9: Xpert® MTB/RIF tests 2016-2018, by province

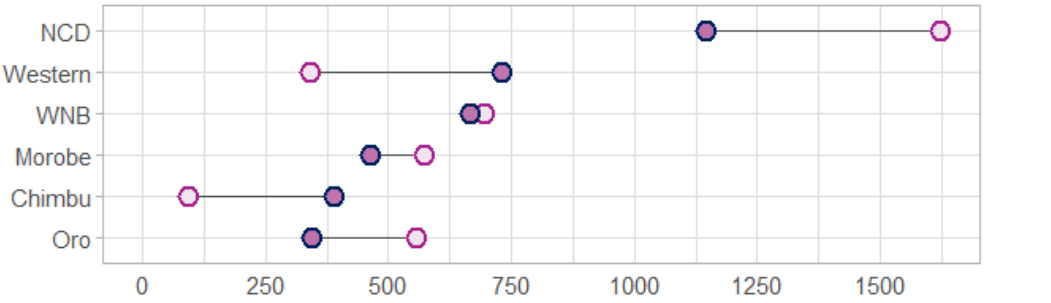
Table 3: Gene Xpert® MTB/RIF expansion from 2016-18

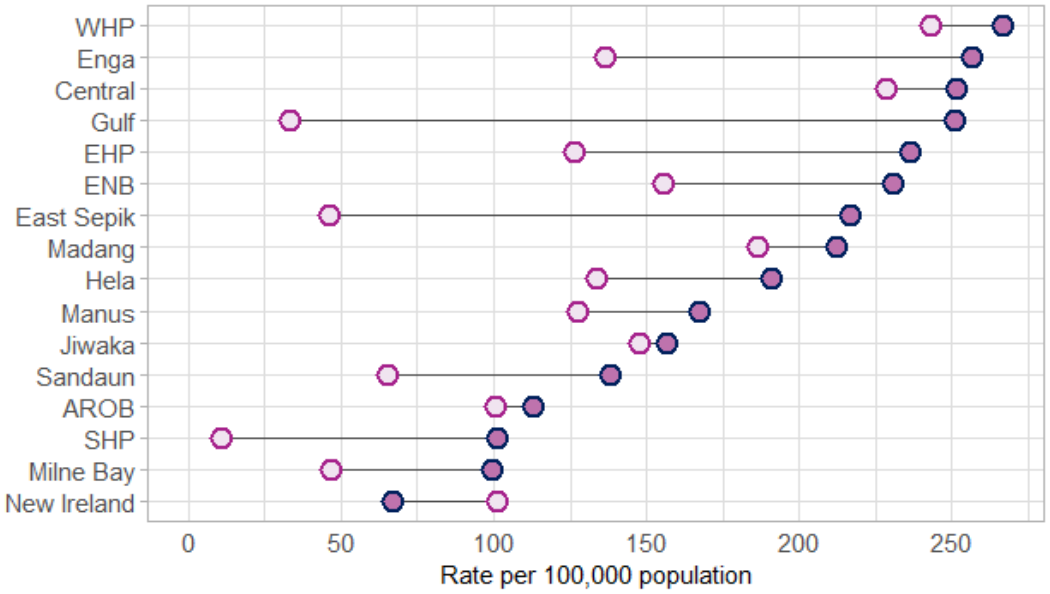
	2016	2017	2018
Number of Xpert® MTB/RIF sites	21	23	28
Number of tests done	11,319	16,752	30,493
Number of RR+ cases diagnosed	351	357	433

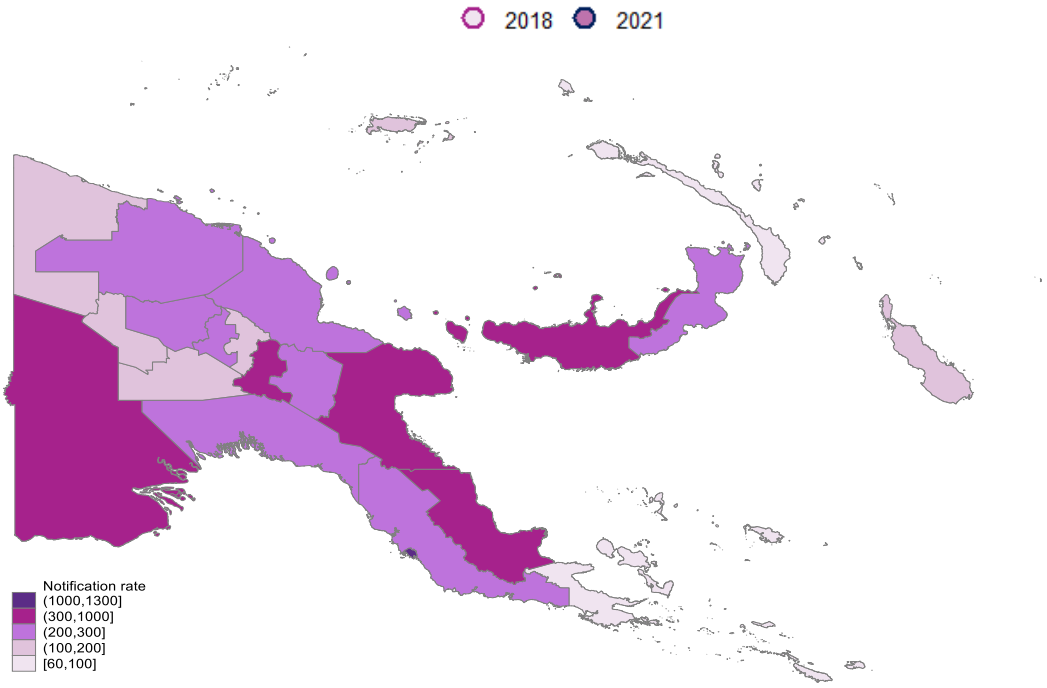
Appendix 7 - Epidemiology of TB in provinces

Upper graph includes six provinces with at least 300 cases per 100,000 notified in 2021, lower graph includes provinces notifying below 300 new and relapse TB cases per 100,000 in 2021

Table 4: The case notification by provinces from 2018-2021.

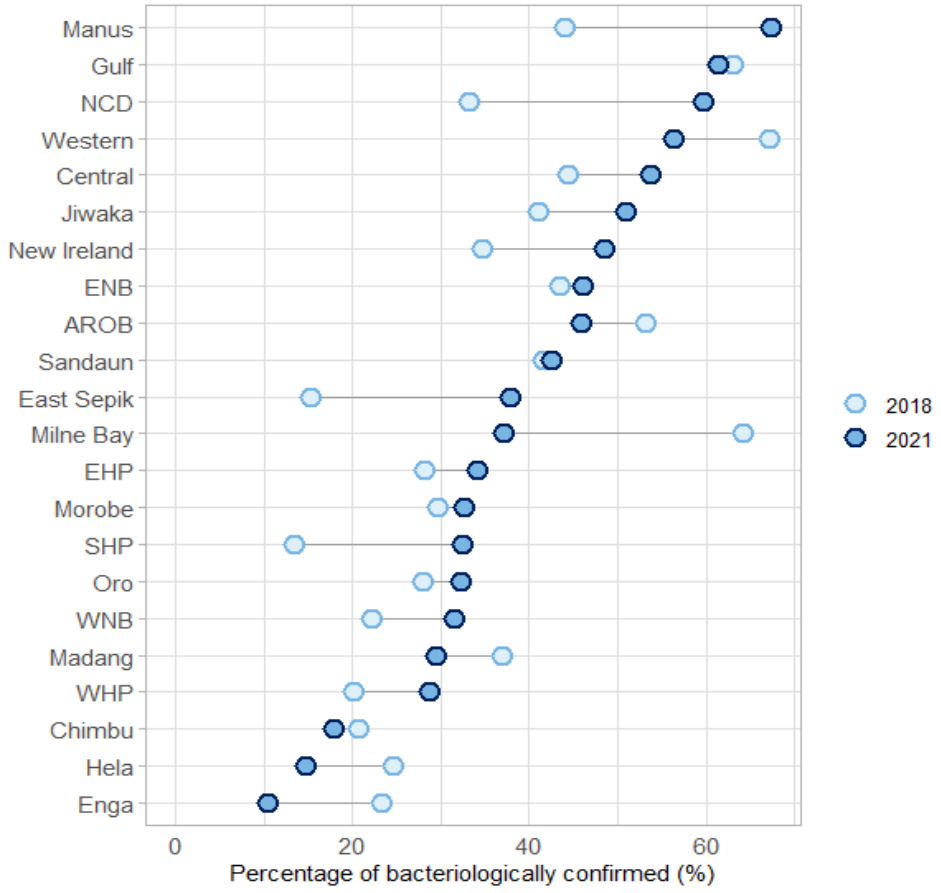






Reporting in bacteriologically confirmed TB cases varies significantly by provinces with 5 provinces reporting less than 30%.

Figure 15: Percentage of bacteriologically confirmed TB by provinces in 2018 and 2021



Treatment success remained below 75% since 2013 although there is some improvement since 2016. Seven provinces reported treatment success rate below 60% in 2021.

Figure 16: Treatment outcome trend in PNG 2013-2020

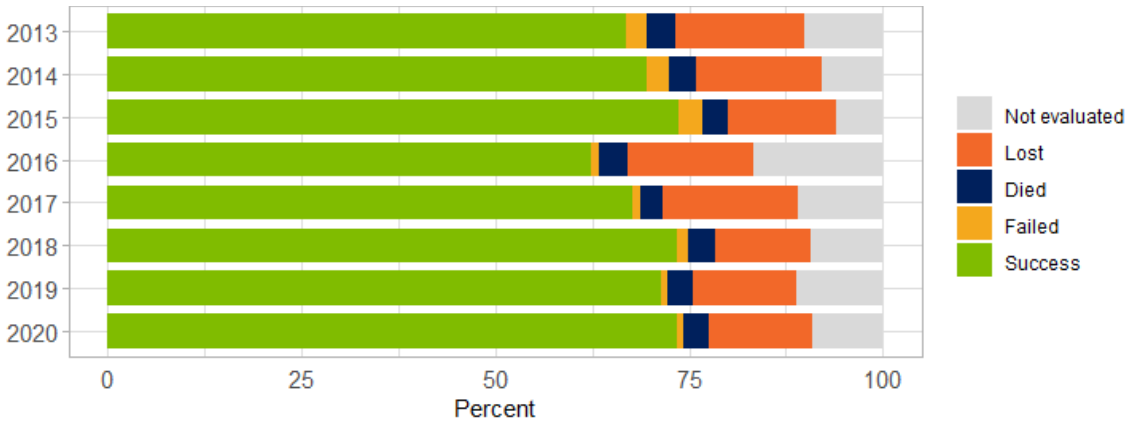
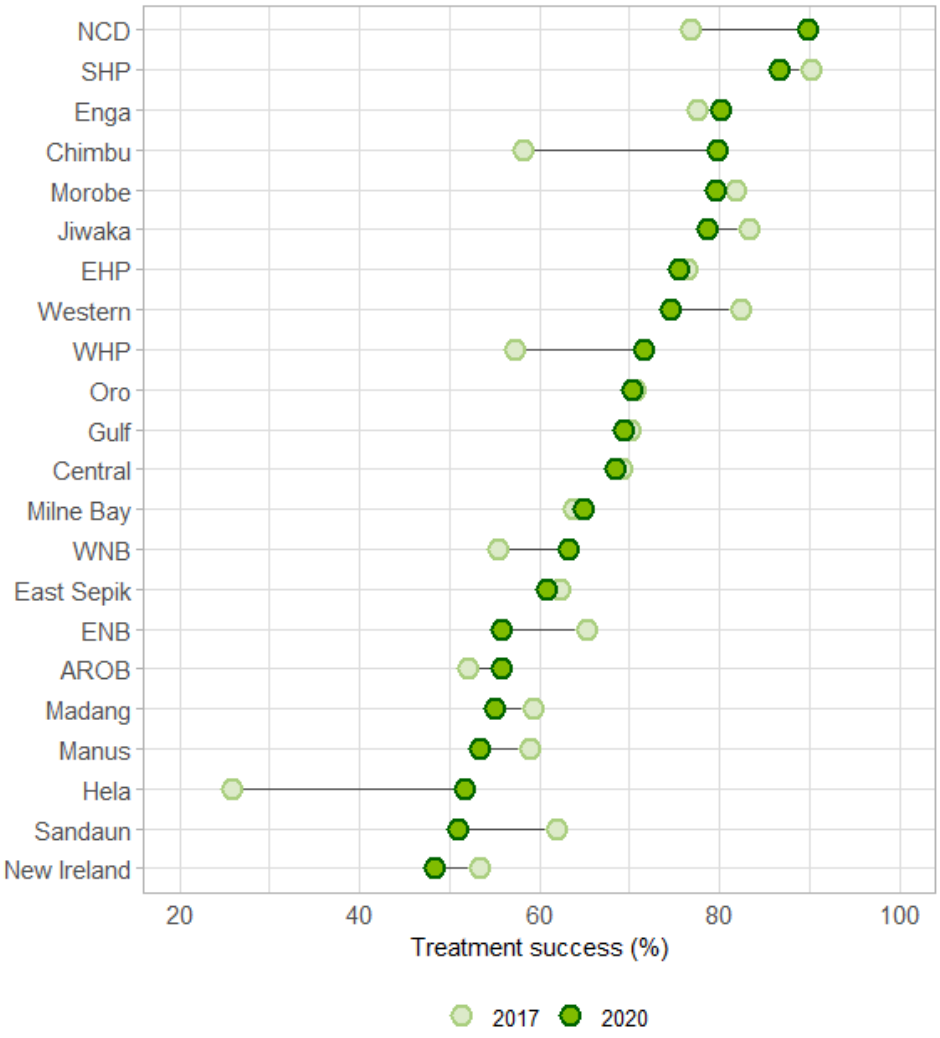


Figure 17: Treatment success rate of new and relapse TB by province in 2017 and 2020



Appendix 8: M&E Framework and indicators

A. Impact indicators

Indicator name	Baseline -2021	Annual Targets					Data source	Reporting frequency	Indicator definition
		2023	2024	2025	2026	2027			
Case Fatality Ratio	13%	8%	7%	6%	5%	4%	WHO TB Global Report	Annually	**Numerator:** Number of TB deaths
									Denominator: Estimated number of incident cases in the same years
TB Incidence Rate (per 100,000 population)	424	381	370	360	350	340	WHO TB Global Report	Annually	**Numerator:** Number of new TB cases
									Denominator: Total population
Percentage of TB affected families experiencing catastrophic costs due to TB	34%	26%	23%	20%	17%	14%	Patient cost survey	Every five years	**Numerator:** Number of people treated for TB (and their households) who incur catastrophic costs (direct and indirect combined),
									Denominator: Total number of people treated for TB

B. Coverage and outcome indicators

Strategic Objective 1: By 2027, to have achieved treatment success rate of at least 85% for all forms of TB									
Indicator name	**Baseline (2021)**	**Annual Targets**					**Data source**	**Reporting frequency**	**Indicator definition**
		2023	**2024**	**2025**	**2026**	**2027**			
Number of BMUs providing TB services	252	257	257	257	257	257	Support and supervisory reports	Annually	
Proportion of BMUs with at least one healthcare worker trained in TB case management	No data	100%	100%	100%	100%	100%	NTP training register	Annually	**Numerator** of BMUs with at least one healthcare worker trained in TB case management **Denominator:** Total number of BMUs
Percentage of cases of all forms of TB (new and relapse clinically diagnosed or bacteriologically confirmed) lost to follow up at the end of TB treatment	20%	10%	7%	5%	=<5%	=<5%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of cases of all forms of TB (new and relapse clinically diagnosed or bacteriologically confirmed) lost to follow up **Denominator:** Total number of cases of all forms of TB (new and relapse clinically diagnosed or bacteriologically confirmed) notified
Percentage of cases with RR-TB and/or MDR-TB started on treatment for MDR-TB who were lost to follow up at the end of treatment	14%	8%	6%	5%	=<5%	=<5%	PMDT reports	Bi-annually & Annually	**Numerator:** Number with RR-TB and/or MDR-TB started on treatment for MDR-TB who were lost to follow up at the end of treatment **Denominator:** Total number of RR/MDR-TB cases notified
Treatment success rate of all forms of TB - bacteriologically confirmed plus clinically diagnosed, new and relapse cases	74%	81%	83%	85%	88%	91%	Global TB Report	Quarterly & Annually	**Numerator**: Number of cases of all forms of TB (new and relapse) diagnosed 12 months prior to the reporting period who were treated successfully (cured plus completed treatment) **Denominator:** Total number of TB cases enrolled on treatment 12 months prior to the reporting period

Proportion of presumptive TB cases confirmed to have active TB that are lost-to-follow-up before treatment is initiated	No data	0%	0%	0%	0%	0%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of presumptive TB cases confirmed to have active TB that are lost-to-follow-up before treatment is initiated **Denominator:** Total number of presumptive TB cases confirmed to have active TB
Proportion of BMUs with adequate up-to date NTP guidelines, treatment protocols and SOPs on the management of TB, TB-HIV co-infection and LTBI	No data	100%	100%	100%	100%	100%	Support and supervisory reports	Annually	**Numerator** of BMUs with adequate up-to date NTP guidelines, treatment protocols and SOPs on the management of TB, TB-HIV co-infection and LTBI **Denominator:** Total number of BMUs
Proportion of childhood TB cases (<15 years) among all forms of TB cases notified	23%	16%	14%	12%	10%	10%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of childhood TB cases (<15 years) notified **Denominator:** Total number of TB cases notified
Treatment success rate of all forms of TB - bacteriologically confirmed plus clinically diagnosed, new and relapse cases for children < 15 years	73%	80%	82%	85%	88%	91%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of cases of all forms of TB (new and relapse) less than 15 years of age diagnosed 12 months prior to the reporting period who were treated successfully (cured plus completed treatment) **Denominator:** Total number of TB cases less than 15 years of age enrolled on treatment 12 months prior to the reporting period
Proportion of BMUs with clinicians trained on childhood TB	No data	100%	100%	100%	100%	100%	NTP training register	Annually	**Numerator** of BMUs with clinicians trained on childhood TB **Denominator:** Total number of BMUs
Number of TB cases with RR-TB and/or MDR-TB notified	481	838	919	1000	1081	1,162	PMDT reports	Bi-annually & Annually	

Number of cases with RR-TB and/or MDR-TB that began second-line treatment	481	838	919	1000	1081	1,162	PMDT reports	Bi-annually & Annually	
Treatment coverage, new TB drugs	1%	65%	77%	90%	100%	100%	PMDT reports	Bi-annually & Annually	**Numerator:** Number of TB patients treated with regimens that include new (endorsed after 2010) TB drugs **Denominator:** Total number of RR/MDR-TB that began second-line treatment
Treatment success rate of RR TB and/or MDR-TB: Percentage of cases with RR and/or MDR-TB successfully treated	72%	81%	83%	85%	88%	91%	PMDT reports	Bi-annually & Annually	**Numerator**: Number of RR/MDR-TB cases diagnosed 24 months prior to the reporting period who were treated successfully (cured plus completed treatment) **Denominator:** Number of RR/MDR-TB cases diagnosed 24 months prior to the reporting period
Proportion of PHAs with adequately trained provincial PMDT focal points and functional core teams	No data	90%	95%	100%	100%	100%	NTP training register	Annually	**Numerator:** Number of PHAs with adequately trained provincial PMDT focal points and functional core teams **Denominator:** Total number of PHAs
Percentage of BMUs reporting stock-outs of first line TB drugs	No data	0%	0%	0%	0%	0%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of BMUs reporting stock-outs of first line TB drugs **Denominator:** Total number of BMUs
Number of BMUs reporting of aDSM incidents	No data	24	24	24	24	24	aDSM reporting form	Quarterly & Annually	
Number of PHAs with functional therapeutic committees in place	5	22	22	22	22	22	Support and supervisory reports	Annually	

Strategic Objective 2: By 2027, at least 90% of people with TB provided with universal drug susceptible tests									
Indicator name	**Baseline -2021**	**Annual Targets**					**Data source**	**Reporting frequency**	**Indicator definition**
		2023	**2024**	**2025**	**2026**	**2027**			
Number of notified cases of all forms of TB (i.e. bacteriologically confirmed + clinically diagnosed), new and relapse cases	28,900	35,236	36,243	37,250	38,000	38,750	Quarterly BMU reports	Quarterly & Annually	
Case Notification Rate for All Forms of TB (per 100,000 population)	290	337	339	342	342	342	Quarterly BMU reports	Annually	**Numerator**: Number of TB patients notified **Denominator:** Total population
TB treatment coverage	68%	88%	89%	91%	93%	95%	Global TB report	Annually	**Numerator**: Number of new and relapse cases that were notified **Denominator:** Estimated number of incident TB cases in the same year
Proportion of presumptive TB cases that had a test for bacteriological confirmation (GeneXpert or Direct sputum microscopy) done	No data	100%	100%	100%	100%	100%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of presumptive TB cases that had a bacteriological confirmation done (GeneXpert or DSM) **Denominator:** Total number of presumptive TB cases identified
Percentage of new and relapse TB	36%	74%	79%	83%	88%	95%		Quarterly & Annually	**Numerator:** Number of new and relapse TB cases notified that had a GeneXpert done at diagnosis

patients tested using WHO recommended rapid molecular tests (GeneXpert) at the time of diagnosis							Quarterly BMU reports		**Denominator:** Total number of TB cases identified
Drug susceptibility testing coverage for TB patients	No data	79%	83%	88%	95%	100%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of TB patients with DST results for at least rifampicin which includes results from molecular (e.g. Xpert MTB/RIF) as well as conventional phenotypic DST results. **Denominator:** Total number of TB cases identified
Percentage of confirmed RR/MDR-TB cases tested for resistance to second-line drugs	58%	76%	82%	88%	94%	100%	PMDT reports	Bi-annually & Annually	**Numerator:** Number of RR/MDR-TB cases that were tested for second line DST **Denominator:** Total number of RR/MDR-TB cases identified
Percentage of laboratories showing adequate performance in external quality assurance for smear microscopy among the total number of laboratories that undertake smear microscopy during the reporting period	68%	85%	88%	90%	90%	100%	CPHL EQA reports	Bi-annually & Annually	**Numerator:** Number of laboratories showing adequate performance in external quality assurance for smear microscopy **Denominator:** Total number of laboratories providing microscopy that participated in external quality assurance
Percentage of laboratories showing adequate performance in external quality assurance for GeneXpert among the total number of laboratories that undertake	45% (29/64; 2022)	60%	70%	80%	90%	100%	CPHL EQA reports	Quarterly & Annually	**Numerator**: Number of laboratories showing adequate performance in external quality assurance for GeneXpert **Denominator:** Total number of laboratories providing GeneXpert that participated in external quality assurance

GeneXpert during the reporting period									
CPHL LPA laboratory showing adequate performance on External Quality Assurance	No data	Yes	Yes	Yes	Yes	Yes	QMRL EQA Report	Annually	
National Drug Resistance Survey conducted			Yes				DRS Report		
Population-based TB prevalence survey conducted				Yes			TB prevalence survey report		
Number of notified TB cases (all forms) contributed by community referral	No data		10%	20%	30%	40%	Quarterly BMU reports	Quarterly & Annually	
Number of notified TB cases (all forms) contributed by the systematic screening initiative	No data						Quarterly BMU reports	Quarterly & Annually	
Number of TB cases (all forms) notified among prisoners	No data	1%	1.5%	2%	2.5%		Quarterly BMU reports	Quarterly & Annually	

Number of TB cases (all forms) notified among key affected populations/ high risk groups (other than prisoners)	No data	1%	1.5%	2%	2.5%	3%	Quarterly BMU reports	Quarterly & Annually	
Contact investigation coverage	59%	82%	88%	94%	96%	100%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of contacts of people with bacteriologically-confirmed TB who were evaluated for TB **Denominator:** Total number of contacts of people with bacteriologically-confirmed TB identified
LTBI treatment coverage for children <5 years	70%	84%	88%	94%	96%	100%	Quarterly BMU reports	Quarterly & Annually	**Numerator**: Number of children aged <5 years who are household contacts of cases started on LTBI treatment **Denominator:** Total number of eligible children aged <5 years who are household contacts identified
Number of notified TB cases (all forms) contributed by private health facilities	No data						Quarterly BMU reports	Quarterly & Annually	
Proportion of people within communities with adequate comprehensive knowledge on TB	No data			95%			KAP survey	Every three years	**Numerator**: Number of KAP study participants that had adequate comprehensive knowledge on TB **Denominator:** Total number KAP study participants
Proportion of TB patients that experienced stigma and discrimination at the health facilities	No Data						Community Based monitoring	Annually	**Numerator**: Number of TB patients participating in the evaluation that reported experiencing stigma and discrimination at the health facilities **Denominator:** Total number of TB patients participating in the evaluation

Strategic Objective 3: By 2025, at least 90% of patients with TB tested and know their HIV status

Indicator name	Baseline -2021	Annual Targets					Data source	Reporting frequency	Indicator definition
		2023	2024	2025	2026	2027			
Number of national joint TB-HIV technical working group meetings conducted	2	4	4	4	4	4	TWG minutes	Annually	
Proportion of BMUs with healthcare workers trained on PITC	No data	90%	95%	100%	100%	100%	NTP training register	Annually	
Proportion of BMUs with healthcare workers trained on IMAI	No data	90%	95%	100%	100%	100%	NTP training register	Annually	
Proportion of BMUs reporting stock-outs of rapid diagnostic kits for HIV	No data	0%	0%	0%	0%	0%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of BMUs reporting stock-outs of rapid diagnostic kits for HIV **Denominator:** Total number of BMUs
Percentage of registered new and relapse TB patients with documented HIV status	59%	83%	86%	90%	93%	95%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of registered all forms of TB patients with documented HIV status (either tested for HIV during treatment or had a valid documented HIV status) **Denominator:** Total all forms of TB patients notified
Percentage of TB patients who are co-infected with HIV provided with ART during treatment	84%	91%	94%	100%	100%	100%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of all forms of TB patients who are co-infected with HIV provided with ART during treatment (either started on ART during TB treatment or had been on ART at the start of TB treatment) **Denominator:** Total all forms of TB patients notified who were co-infected with HIV

Percentage of PLHIV currently on ART who are screened for TB	54%	71%	78%	100%	100%	100%	HIV Patient Database	Quarterly & Annually	**Numerator:** Number of PLHIV currently on ART who are screened for TB **Denominator:** Total of PLHIV currently on ART
LTBI treatment coverage for PLHIV newly enrolled in HIV care	18%	52%	56%	59%	62%	70%	HIV Patient Database	Quarterly & Annually	**Numerator:** Number of eligible PLHIV newly enrolled on ART who were initiated on LTBI treatment **Denominator:** Total of eligible PLHIV newly enrolled on ART
Proportion of ART centres with healthcare workers trained on TB case management	No data	90%	95%	100%	100%	100%	NTP training register	Annually	**Numerator:** Number of ART centres with healthcare workers trained on TB case management **Denominator**: Total number of ART centres
Proportion of BMUs with up to date guidelines and SOPs on TB infection prevention and control (IPC)	No data	90%	95%	100%	100%	100%	Support and supervisory reports	Annually	**Numerator:** Number of BMUs with up to date guidelines and SOPs on TB infection prevention and control (IPC) **Denominator**: Total number of BMUs
Proportion of BMUs with adequate TB IPC measures in place	No data	90%	95%	100%	100%	100%	Support and supervisory reports	Annually	**Numerator:** Number of BMUs with adequate TB IPC measures in place **Denominator**: Total number of BMUs
Number of TB cases (all forms) notified among healthcare workers	No data						Quarterly BMU reports	Quarterly & Annually	
Proportion of BMUs reporting stock-outs of PPEs (surgical face masks & N95 respirators)	No data	0%	0%	0%	0%	0%	Quarterly BMU reports	Quarterly & Annually	**Numerator:** Number of BMUs reporting stock-outs of PPEs (surgical face masks & N95 respirators) **Denominator:** Total number of BMUs
Proportion of BMUs with healthcare workers trained on TB IPC	No data	90%	95%	100%	100%	100%	NTP training register	Annually	**Numerator:** Number of BMUs with healthcare workers trained on TB IPC **Denominator**: Total number of BMUs

Proportion of ART centres with healthcare workers trained on TB IPC	No data	90%	95%	100%	100%	100%	NTP training register	Annually	**Numerator:** Number of ART centres with healthcare workers trained on TB IPC **Denominator**: Total number of ART centres

Strategic Objective 4: By 2027, the technical and managerial capacities of the tuberculosis program at the national, regional, provincial and district levels for the provision of quality TB services are strengthened									
Indicator name	**Baseline -2021**	**Annual Targets**					**Data source**	**Reporting frequency**	**Indicator definition**
		2023	**2024**	**2025**	**2026**	**2027**			
NTP vacancy rate	No data	0%	0%	0%	0%	0%	NTP Organogram	Annually	**Numerator:** Number of NTP vacancies open **Denominator**: Total number NTP vacancies available
Number of NTP officers attending TB specific trainings (including project management and operational research)	No data	4	5	6	7	8	NTP training register	Annually	
Number of operation research conducted and published	No data	4	5	6	7	8	NTP Annual report	Annually	
Annual NTP report published on time	Yes	Yes	Yes	Yes	Yes	Yes	NTP Annual report	Annually	
Proportion of BMUs utilising the e-TB module (eNHIS) for recording and reporting to the NTP	No data	30%	50%	70%	90%	100%	NTP Annual report	Annually	

Number of provincial data quality audits conducted	No data	7	7	7	7	7	DQA report	Annually	
Mid-term and end-term external program review conducted	Yes	No	Yes	No	No	Yes	External Program Review report	2023 and 2025	
Number of rGLC mission conducted	Yes	yes	Yes	yes	Yes	yes	rGLC report	Every two years	
Number of quarterly NTP supervisory and mentorship visits to PHAs conducted	No data	88	88	88	88	88	Support and supervisory reports	Annually	
Number of monthly PHA supervisory and mentorship visits conducted to BMUs	No data	3,024	3,024	3,024	3,024	3,024	Support and supervisory reports	Annually	
Annual national TB program review and planning meeting conducted by NTP	Yes	Yes	Yes	Yes	Yes	Yes	Annual NTP review meeting report	Annually	
Number of quarterly provincial review and planning meetings conducted by PHAs	No data	88	88	88	88	88	Provincial review meeting reports	Quarterly & Annually	
Proportion of PHAs with Provincial TB/HIV coordinators in post	No data	100%	100%	100%	100%	100%	Support and supervisory reports	Annually	
Percentage of BMUs submitting timely reports according to national guidelines	39%	50%	60%	70%	80%	90%	BMU Timely submission tracker	Quarterly & Annually	**Numerator:** Number of BMUs submitting timely reports according to national guidelines **Denominator:** Total number of BMUs

Proportion of PHAs with functional CBOs working in TB	14%	14%	32%	68%	100%	100%	Support and supervisory reports	Annually	**Numerator:** Number PHAs with functional CBOs working in TB **Denominator:** Total number of PHAs
Proportion of National TB budget supported by domestic funding	52%	58%	59%	60%	62%	65%	WHO TB Global Report	Annually	**Numerator:** National TB program budget supported by domestic funding **Denominator:** Total National TB program budget

Appendix 9: Costing of NSP 2023 - 2027

Table 5: Annual and total cost (PGK & USD) of the NSP 2023 - 2027

Summary costs (PGK) - PNG TB National Strategic Plan						
	2023	**2024**	**2025**	**2026**	**2027**	**Total**
Programme Costs						
Training	94,000	4,195,160	2,029,778	2,896,360	978,500	10,193,798
Supervision	252,000	266,580	282,008	298,333	315,608	1,414,528
Monitoring and Evaluation	5,104	229,809	173,299	182,951	193,145	784,308
Medical Equipment and Supplies	10,402,793	10,187,933	10,697,329	11,232,196	11,793,806	54,314,056
Communication, Media and Outreach	750,000	790,500	833,205	878,236	925,721	4,177,662
Advocacy	599,400	433,415	389,153	408,611	429,041	2,259,621
General Programme Management	730,800	766,444	602,361	618,062	653,901	3,371,569
TB Specific Activities	9,749,498	12,008,321	11,867,186	14,193,154	12,869,189	60,687,348
Total Programme Costs	**22,583,595**	**28,878,162**	**26,874,319**	**30,707,903**	**28,158,910**	**137,202,889**
Human Resources						
Staff salaries and benefits	61,303,314	61,303,314	61,303,314	61,303,314	61,303,314	306,516,570
Total Human Resources	**61,303,314**	**61,303,314**	**61,303,314**	**61,303,314**	**61,303,314**	**306,516,570**
Infrastructure						
Equipment, furniture and vehicles	0	5,478,900	1,098,233	1,098,233	1,098,233	8,773,599
Rehabilitation Costs	0	3,000,000	3,000,000	1,500,000	5,400,000	12,900,000
Maintenance and Operating Cost	0	109,280	109,280	109,280	109,280	437,120
Total Infrastructure	**0**	**8,588,180**	**4,207,513**	**2,707,513**	**6,607,513**	**22,110,719**
Logistics						
Total warehouse costs	0	1,570,000	0	0	0	1,570,000
Total Logistics	**0**	**1,570,000**	**0**	**0**	**0**	**1,570,000**
Medicines, commodities, and supplies						
Medicines, commodities and supplies	41,302,810	22,301,626	24,102,146	26,046,577	28,131,911	141,885,070
Total Medicines, commodities, and supplies	**41,302,810**	**22,301,626**	**24,102,146**	**26,046,577**	**28,131,911**	**141,885,070**
Health Information Systems						
HIS dimension costs	63,000	65,400	83,600	11,000	11,000	234,000
Programme management costs	340,000	510,000	510,000	340,000	340,000	2,040,000
Total Health Information Systems	**403,000**	**575,400**	**593,600**	**351,000**	**351,000**	**2,274,000**
Grand Total (PGK)	**125,592,719**	**123,216,682**	**117,080,892**	**121,116,307**	**124,552,648**	**611,559,248**
Grand Total (USD)	**37,048,601**	**36,347,693**	**34,537,697**	**35,728,104**	**36,741,790**	**180,403,885**

Table 8: Costs by objectives 2023- 2027

Objective 1: Increase the treatment success rate of all forms of TB	**2023**	**2024**	**2025**	**2026**	**2027**	**Total**
Intervention 1.1 Expand access to TB treatment centres	13,686,573	19,887,081	17,768,601	17,404,017	20,306,204	89,052,474
Intervention 1.2 Community-based service delivery to address access barriers	2,672,705	4,176,609	2,687,339	3,481,141	2,703,782	15,721,575
Intervention 1.3 Prompt initiation of appropriate treatment for all people with DS and DR-TB	25,702,150	16,014,899	14,225,506	18,013,030	18,391,508	92,347,094
Intervention 1.4 Strengthen the management of childhood TB	3,949,857	3,812,005	2,951,205	2,971,050	2,991,887	16,676,003
Intervention 1.5 Strengthen Programmatic Management of Drug-Resistant Tuberculosis (PMDT)	2,972,705	2,723,480	2,897,339	1,147,336	2,935,307	12,676,166
Intervention 1.6 Ensure the provision of quality assured anti-TB drugs and active drug safety monitoring	2,672,705	2,686,099	778,215	2,702,256	2,711,064	11,550,338
Subtotal	***51,656,694***	***49,300,172***	***41,308,204***	***45,718,829***	***50,039,750***	**238,023,650**
Objective 2: Universal drug susceptibility testing (DST) for all people with TB by 2025						
Intervention 2.1 Expand access to early diagnosis of all people with DS and DR-TB	25,278,014	18,006,776	17,064,744	5,618,778	19,838,138	85,806,451
Intervention 2.2 Systematic screening of high-risk groups	3,588,677	3,640,396	3,394,700	15,472,680	3,811,591	29,908,043
Intervention 2.3 Contact tracing for pulmonary bacteriologically confirmed TB cases	6,993,960	6,995,049	8,928,602	9,562,317	9,912,717	42,392,645
Intervention 2.4 Treatment of Latent TB Infection	3,348,947	3,051,824	3,237,179	3,432,292	3,637,163	16,707,405
Intervention 2.5 Engagement of the private sector for TB care	939,296	2,554,305	2,574,045	2,544,305	2,575,032	11,186,983
Intervention 2.6 Reduce stigma in the general population and among health care workers	3,005,205	2,736,545	2,745,657	2,755,225	2,765,271	14,007,903
Subtotal	***43,154,099***	***36,984,894***	***37,944,927***	***39,385,597***	***42,539,912***	**200,009,429**
Objective 3: To strengthen TB/ HIV collaborative activities and increase the proportion of TB patients with a documented HIV status to 100%.						
Intervention 3.1 Provision of one-stop-shop integrated TB/ HIV care at BMUs and ART centres	3,846,257	4,454,147	4,416,349	4,445,594	4,043,117	21,205,464
Intervention 3.2 Intensified case finding among PLHIV	3,831,457	5,019,707	5,010,187	5,069,124	3,831,457	22,761,932
Intervention 3.3 Scale-up TB preventive treatment to all eligible PLHIV	3,831,457	4,271,307	4,224,367	4,244,013	3,831,457	20,402,601
Intervention 3.4 Improve TB infection prevention and control	3,831,457	4,784,957	4,694,767	4,737,933	4,783,256	22,832,370
Subtotal	***15,340,628***	***18,530,118***	***18,345,670***	***18,496,664***	***16,489,287***	**87,202,367**
Objective 4: To strengthen the technical and managerial capacities of the National TB Program at all levels for provision of quality TB services by						
Intervention 4.1 Building capacity of the National TB Program at the central level	3,065,166	3,303,766	3,177,831	3,164,391	3,169,352	15,880,506
Intervention 4.2 Strengthening surveillance, research and use of data for decision making	3,742,666	4,729,213	4,208,796	4,390,484	4,019,755	21,090,914
Intervention 4.3 Strengthening capacity of PHAs for provision of quality TB services in the provinces	3,065,166	3,552,416	3,114,936	3,510,335	3,120,037	16,362,890
Intervention 4.4 Improve government commitment and resource mobilization	3,365,166	3,394,966	3,411,456	3,428,771	3,446,951	17,047,310
Intervention 4.5 Reduce catastrophic cost among TB-affected households	3,165,166	3,184,966	3,190,956	3,197,246	3,203,848	15,942,182
Subtotal	***16,403,330***	***18,165,327***	***17,103,975***	***17,691,227***	***16,959,943***	**86,323,802**
TOTAL (PGK)	***126,554,751***	***122,980,512***	***114,702,776***	***121,292,317***	***126,028,893***	***611,559,248***
TOTAL (USD)	**37,332,391**	**36,278,026**	**33,836,176**	**35,780,025**	**37,177,268**	**180,403,885**

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