National Strategic Plan for Tuberculosis Control (2018-2021)

Ministry of Public Health

Democratic People's Republic of Korea

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Contents

Executive summary

This National Strategic Plan 2018 – 2021 defines the direction that the National TB Control Program (NTP) of the Ministry of Public Health, Democratic People's Republic of Korea, will follow for the next four years to achieve successful TB prevention, care and control in the country. The country is committed to TB control efforts and defines its goals and objectives taking into account the Global END TB Strategy in order to contribute to global effort to fight TB epidemic. The strategies outlined in this NSP are guided by the Global END TB Strategy Framework, which has been approved and adopted by the 67th World in May 2014.

The country's official representative signed the Call to Action from the "Ministerial Meeting: Ending TB in the South East Asian Region" in New Delhi, in March, 2017. The DPRK has thereby committed to increase the government budgetary contribution to TB control.

Table 1: SDG and END TB Strategy Framework

Vision	A World Free of TB *(Zero TB deaths, diseases and suffering due to TB)*
Goals	End the Global TB Epidemic
Milestones for 2020 (compared to 2015)	✧ 35 % reduction in TB deaths ✧ 20 % reduction in TB incidence (<85/100,000) ✧ No affected families face catastrophic costs due to TB
Milestones for 2025 (compared to 2015)	✧ 75 % reduction in TB deaths ✧ 50 % reduction in TB incidence (< 55/100,000) ✧ No affected families face catastrophic costs due to TB
SDG Target (2030) (compared to 2015)	✧ 90 % reduction in TB deaths ✧ 80 % reduction in TB incidence (< 22/100,000) ✧ No affected families face catastrophic costs due to TB
END TB Target (2030) (compared to 2015)	✧ 95 % reduction in TB deaths ✧ 90 % reduction in TB incidence (< 55/100,000) ✧ No affected families face catastrophic costs due to TB
Principles	
1. Government stewardship and accountability, with monitoring and evaluation *2. Strong coalition with civil society organizations and communities* *3. Protection and promotion of human rights, ethics and equity* *4. Adaptation of the strategy and targets at country level, with global collaboration*	
Pillars and Components	
1. Integrated, patient-centered care and prevention A. Early diagnosis of TB including drug-susceptibility testing, and systematic screening of	

contacts of high-risk groups B. Treatment of all people with TB including drug-resistant TB, and patient support C. Collaborative TB/HIV activities, and management of co-morbidities D. Preventive treatment of persons at high risk, and vaccination against TB
2. Bold policies and supportive systems A. Political commitment with adequate resources for TB care and prevention B. Engagement of communities, civil society organizations, and public private provider C. Universal health coverage policy, and regulatory framework for case notification, vital registration, quality and rational use of medicines and infection control D. Social protection, poverty alleviation and actions on other determinants of TB
3. Intensified research and innovation A. Discovery, development and rapid uptake of new tools, interventions and strategies B. Research to optimize implementation and impact, and promote innovations

The National Strategic Plan for Tuberculosis Control 2018 – 2021 (NSP) for Tuberculosis Control was developed by the National TB Control Program through a consultative process with representation of all key stakeholders. An evidence-based approach was adopted wherein an objective situational analysis of the epidemiological, social, cultural, gender and institutional determinants of TB in the country was carried out. The NTP also assessed and incorporated the outcomes and programmatic lessons learnt during the implementation of the previous NSP (2015-2018) along with recommendations of the Joint Monitoring Mission held in May 2017.

The vision of this strategic plan is a DPRK free of TB, with the goal to decrease the morbidity and mortality of TB. A TB free country means – Zero deaths, disease and suffering due to tuberculosis. The main task for the NTP ahead is to sustain the success achieved so far and to improve access to quality assured diagnosis and treatment for all forms of TB including drug resistant TB (DR-TB). The NTP has incorporated the three pillars and components outlined in Global END TB Strategy framework when defining the objectives, interventions and activities.

The objectives are to:

1. Scale up services for diagnosis of TB to achieve case detection rate of 95% with the baseline identified by results of National TB Prevalence Survey.

2. Ensure the quality of services for TB treatment and maintain a treatment success rate of more than 90%.

3. Expand access to drug resistant TB diagnosis and treatment services to reach more than 90% of newly occurring MDR-TB cases including pediatric cases by 2021, and achieve treatment success rate of at least 70%.

4. Engage with civil society, NGOs, key affected populations (including children), and other health programs for TB prevention, care and control, and sustain the existing social protection measures for TB affected families.

5. Strengthen operational research and innovations for backing up TB control.

There are 7 strategic directions for TB control identified in this National Strategic Plan and they align closely with the three pillars of the END TB Strategy Framework. The objectives will be achieved through these 7 strategies and multiple interventions and activities planned with a detailed and costed operational plan which will be monitored through the Monitoring and Evaluation plan.

Pillar 1: Integrated, patient-centered care and prevention

Strategy 1: Strengthen the nation-wide TB diagnosis network and actively find the missing TB cases

Strategy 2: Improve the quality of treatment services through patient-centered integrated services focused on ambulatory care and social support

Strategy 3: Rapid expansion and successful implementation of Program Management of Drug-resistance TB to the nation-wide scale

Strategy 4: Improve the quality of Monitoring and Evaluation approaches and strengthen TB surveillance system

Pillar 2: Bold policies and supportive systems

Strategy 5: Foster multi-sectoral approaches with other government authorities, civil society, NGOs, other health programs including nutrition program and health facilities out of NTP to improve the prevention, diagnosis and treatment of TB

Strategy 6: Contribute to Strengthening Health System focused on improving the quality of patient care through Primary Health Care approach

Pillar 3: Intensified research and innovation

Strategy 7: Promote TB research including clinical, operational and development research

project for effective control of TB.

Country Background & Health system

The Democratic People's Republic of Korea is located in the Korean Peninsula situated in North East Asia, bordering China and Russia and surrounded by sea on 3 sides. The total area of DPRK is more than 123,138 km2and geographically80%ofthe country is mountainous and 17% is cultivatable land.

Figure1: Map of Democratic People's Republic of Korea

Pyongyang is the capital of DPRK and also the largest city in the country. The country is divided into 9 provinces and 3 municipalities (Pyongyang city, Rason city and Nampho city). The provinces are subdivided into smaller administrative units of counties/cities/districts and the counties are further subdivided into over 4,000 *Ri, Up* or *Gu*(rural areas) whereas city/district are divided into *Dong* (urban areas). The climate is temperate with the cold weather during winter and heavy rainfall in the summer months, particularly in August, with

a average annual temperature ranging from 8-12℃ and precipitation at 1000-1200 mm per year.

The DPRK has a homogenous population who speak one national language. The DPRK was founded on 9 September1948 and is based on Juche-oriented philosophy which is man-centered, focusing on independence, self-reliance and self-defense.

Demography

The total population of DPRK is estimated at about 24,624,639(2014) with 12,004,633 males and 12,620,006females

Female population was slightly larger than male population with the ratio of 95.1 males to 100 females. Population density was 215 per km2 at the end of 2014. The total fertility rate has reduced to 1.9 in 2014. The life expectancy at birth is 67.1 years in male and 74.5 years in female. The crude birth rate is 13.9 per 1,000 population and the total fertility rate is 1.9 per woman. With 13.4% of population aged over 60 years, DPR Korea has the largest proportion of the elderly age group of the national population in the South-East Asia (SEA) region. Above 60% of the population live in urban areas.

Table2: Health Indicators in DPRK

Basic Indicators	Data
Average life expectancy at birth	71.7 years(Annual health report 2013)
Male life expectancy at birth	67.1 years(Annual health report 2013)
Female life expectancy at birth	74.5 years(Annual health report 2013)
Crude birth rate	13.9 per1000(Annual health report 2013)
Crudedeath rate	8.4 per1000(Annual health report 2013)
National population growth rate	0.53%(Annual health report 2013)
Total fertility rate	1.9 per woman (Annual health report 2013)
Population under 15 years	20.8%(Annual health report 2013)
Population 60 years and over	13.3%(Annual health report 2013)
Urban population	61%(Annual health report 2013)

Socio-Economic Status

DPRK's economy has adhered to self-reliant development strategy, demonstrated in economic policies on domestic industrial development, foreign trade, foreign capital, imported technology, and other forms of international economic cooperation. Priority is

assigned to establishing an independent national economy. Consumer goods are produced primarily to satisfy domestic demand. The government of DPRK is the dominant force in the development and management of the economy, bureaus and departments have proliferated at all administrative levels.

In the late 1980s and early 1990s, the collapse of Socialism and Socialist Economy, numerous natural disasters including severe drought and flooding in rapid succession and economic sanctions have challenged economic development in the country and resulted in massive contraction in the size of economy.

During 1990-2000, GDP per capita was decreased, but during 2000-2011, GDP per capita was increased.
Severe drought and flooding in rapid succession brought about a great damage to mining and agriculture. Due to the inconsistent power supply, rundown water and sanitation system, and damaged road, national capacity for social service was considerably impaired.

However, the combination of geographical isolation and political and economic sanctions has not only physically cut off DPRK from regular interrelationship, international trade, and commercial activities, but also created problems of transport, communications, overall nutrition and health.

Health Policy and Priority

The DPRK sets as a key human right the promotion of its people's health, and guarantees the health of the people as its political and legal responsibility. National health policy shows that political direction to ensure the health benefit reaches out to all people.

The health system of the DPRK is modeled on a socialist health system and is entirely managed by the government, as there is no private health sector. Universal and free health care is guaranteed in the country's Constitution of1960 and Public Health Law of1980. The Public Health Law particularly emphasizes commitment to health care system that is equally preventive and curative, and gives a special priority to women's and children's health. The basis of DPRK's health system is the "Household Doctor System".

The core in health policy in DPRK is the thorough implementation of policy of preventive medicine and universal free medical care system. Under Article72 of the Constitution of the DPRK, the State bears full responsibility for the life and health of all citizens and guarantees; a) implementation of universal free medical care system for the people; b) that priority is given to preventive medicine; and c) the establishment of a well-regulated health system from the central down to the Ri level, and a predominant household doctor system.

Health work is regarded as a priority area with health promotion of the people featured above all other national policies. The good examples are social attention and country-wide support to the health sector, community participation in health work and systematically increased domestic investment in the health sector even in difficult economic situation. Even important development projects are not permitted if they undermine people's health.

As a State Party to the International Covenant on Economic, Social and Cultural Rights (ICESCR) since 1981, International Covenant on Civil and Political Rights in 1981, Convention on the Rights of the Child in 1990, the adoption of the platform of action of the International Conference on Population and Development (ICPD) in 1994 together with the 2001 accession to the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW) affirm the government's recognition of the rights of everyone to the enjoyment of the highest attainable standard of physical and mental health and emphasizes its notable commitment to reproductive health rights, guaranteeing women's reproductive rights and recognizing women's equal social status.

A Medium Term Strategic Plan (2010-2015) was developed, in cooperation with WHO, for development of the overall health sector in the DPRK. It was aimed at mobilizing and coordinating governmental and international fund resources in order to reach the objectives 4 and 5 of MDG on reducing the mortalities of pregnant and lactating mothers and children to 2⁄3 by 2015 as compared to 1990, and a marked reduction of incidence and infection of Malaria and TB. This program includes health systems strengthening (HSS), prevention and control of communicable and non-communicable diseases, with objectives and goals and health program activities, including environmental factors affecting health.

Table3: Main contents of the medium term strategic plan for health development

Strategy 1:Health System Strengthening

1. To improve quality of service through rehabilitation of health facilities, referral transportations and information means 2. To build capacity of Household Doctors through information, education and communication (IEC) project and strengthen primary health care system by sufficient supply of essential drug and equipment to all Ri clinics by2015. 3. To build capacity of management and information at provincial and county levels 4. To advocate for developing innovative financial investment means, including the foundation of a DPRK Health Development Fund aimed at mobilizing international resources to meet the financial gap in health programs 5. To strengthen fund raising capability by forming joint health forum with government and development partners and improve overall health management.
Strategy 2:Prevention and control of Non-communicable Disease
1. To put stress on treatment of elderly and disabled and strengthen the ability for surveillance and treatment of non-communicable diseases at all levels of health sector (including establishing National Health Institute for prevention and control of non-communicable disease) 2. To implement a program on reducing the adult smoking rate from 52% to 45 % by2015
Strategy 3:Control of communicable disease
1. To eliminate malariaby2015 2. To increase immunization rate to over 97% for all vaccines 3. To maintain HIV-free status 4. To increase detection rate of Tuberculosis
Strategy 4:Maternal and child health
1. To strengthen Integrated Management of Childhood Illnesses (IMCI) in all counties by2015 2. To enhance the emergency obstetric care to defined level in 10 out of 12 provinces by 2015
Strategy 5:Socio-environmental factors affecting health
1. To improve quality of water and sanitation system in 30%ofhealth facilities in the countryby2015 2. To build capacity to respond to emergencies against influence of climate change to health in DPRK and develop responsive program

The core areas in the country's health sector focus on strengthening the household doctor system, rapid development of medical sciences, and the building of a firm base of Juche-oriented independent industry of pharmaceuticals and medical equipment, which are the means of bringing the advantages of a socialist health system, including free medical care system, into full play.

Health Profile

During 2011-2015, successes have been achieved in public health sector and some health indicators have started to be improved.

IMR, UMR & MMR was lowered achieving the MDGs, and Medium-Term Health Sector Strategic Plan 2011-2015 was developed. The vaccine coverage for penta-valent and BCG vaccination was at about 90% and for measles it is 98%.

Control of communicable diseases is one area in which progress has been substantial. Sustained programmatic attention to malaria prevention and malaria control reduced cases from as high as 296,540 in2001 to 15,673 in 2013. MoPH managed to improve early detection, diagnosis and early treatment, distribution of insecticide treated mosquito nets to high risk areas and health education activities.
And also many successes like Expanding Basic & Comprehensive Emergency Obstetric Care capacity and renovation & upgrade of health facilities have been achieved.

Health System

The MoPH is one of the ministries under the Cabinet, which bears the full responsibility for overall health work in the country. It supervises all health work (including nurseries) and ensures that health work becomes owned by all of society and the country in relation with other ministries by governing health departments in the provincial people's committees, central level hospitals, and specialized hospitals affiliated to MoPH, central level hygiene and anti-epidemic institutes and drug supply facilities. The MoPH also organizes non-permanent committees to respond to health issues caused by emergencies and disasters.

The Health departments in the provincial people's committees are responsible for supervising, under the guidance of MoPH, the city/county level health facilities, provincial people's hospitals, specialized hospitals, provincial hygiene and anti-epidemic institutes and drug supply units and oversees overall health work in the respective province.

Under the guidance of the provincial people's committee, the City/county health departments are responsible for the health work in the cities/counties through supervision of

the therapeutic and preventive activities at the city/county level people's hospitals, Ri-people's hospitals/clinics and city/county level hygiene and anti-epidemic institute and drug supply units. All hospitals and hygiene and anti-epidemic institutes at all levels are responsible for technical and methodological guidance to the lower level health facilities.

The city/district/county people's hospitals are comprehensive units with dedicated departments who provide special services to the patients referred from lower level. Central and provincial people's hospitals and special health facilities are higher level units for specialized health service delivery. There are133 comprehensive and specialized hospitals at central and provincial level, 601 people's hospitals at city (district) and county level, and 7237 people's hospitals, polyclinics and clinics at Ri and Dong level.

Drug and logistics supply system includes Central Medical Warehouse (CMW), Provincial Medical Warehouses (PMW) and county Medical Warehouses (cMW). There is an extensive system established for procuring drugs and distribution to all hospitals and health facilities through CMW, PMWs and cMWs. The quantity and items of the drugs depend on the reported incidence of certain diseases. The utilization of the drugs is done by prescription of doctors. Quality control tests are arranged in national, provincial level by the drug regulatory authorities, for all drugs produced or imported to assure quality of the efficacy and pharmaco-vigilance. The registration of a drug follows the national norms and procedures, and adverse effect of drugs is monitored in all hospitals and drug regulatory authorities on regular basis.

This inclusive health infrastructure is very advantageous in health system, but the quality of service is not of a high level. The interrupted supply of power and water, and lack of other basic facilities to health sector affects the out-patients and in-patients diagnostic and health care. Most hospitals are facing challenges in laboratory quality assurance (QA) and supply of essential drugs. Recently the technical visits of the higher level health facilities to the lower units have been limited because of the lack of transportation. The same is applicable for the transportation of drugs and logistic supplies. The lack of vehicles and the costs of transport have resulted in a decrease in the quality of service delivery (for example referral of patients, transporting members and preventive medicines). The insufficient infrastructure of communication and available road network also interferes with service delivery. The communication of health staff between higher and lower level units are not well maintained

for the lack of good communication facilities, which affects recording, reporting and case management.

The tele-medicine network in DPRK covers the country connecting the central level (via 4 sites), the provincial level (at 10 provincial maternity hospitals and 10 provincial pediatric hospitals) and 189 county hospitals. A total of 213 sites are now covered by a tele-medicine and tele- monitoring for surgery network system. Implementation of the system was actively supported by WHO and the DPRK government in four phases.

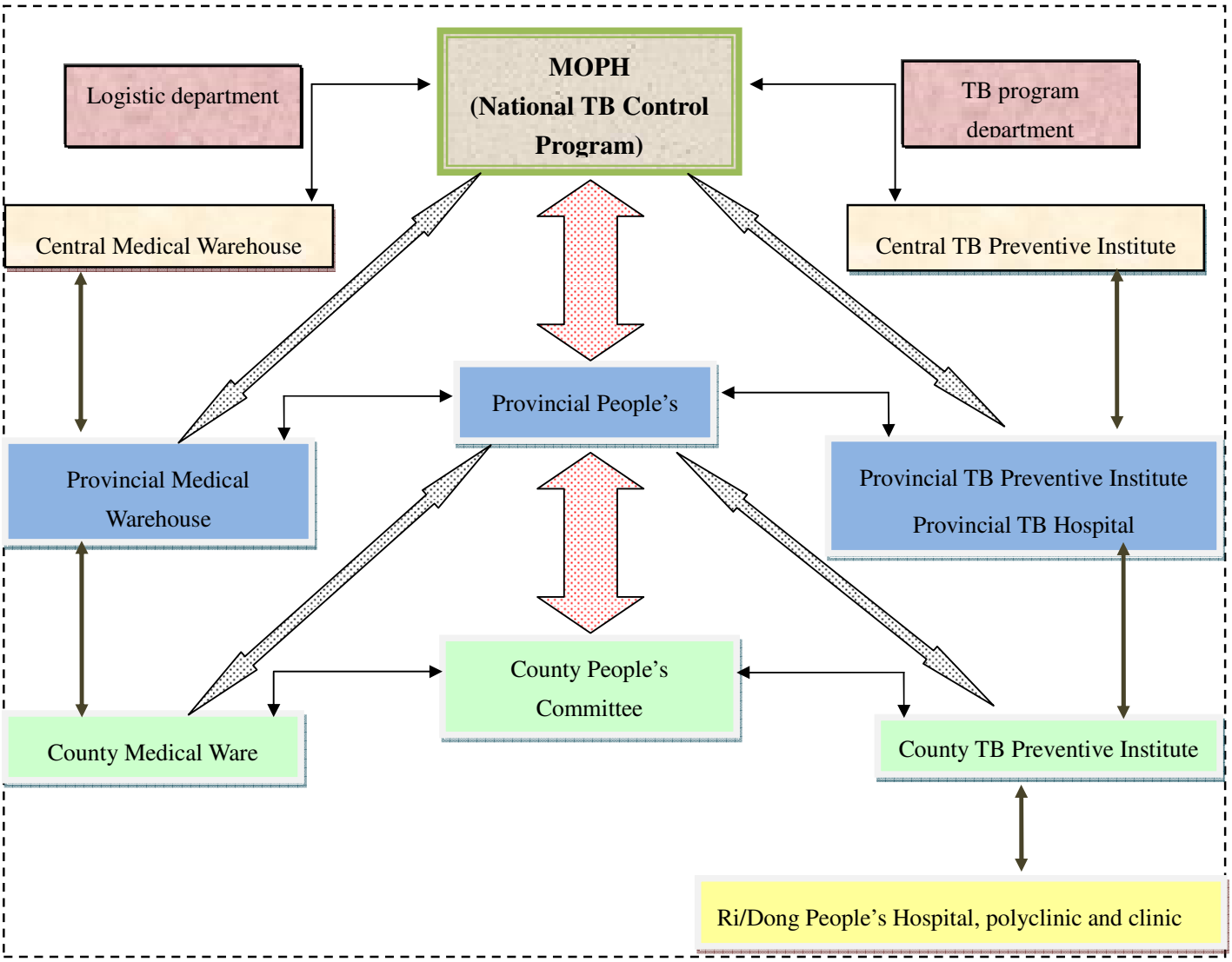
As of 2014, there were almost 87,780 physicians, 93,400 nurses, 7,368 midwives, 9,463 pharmacists, and pharmaceutical technicians and assistants are serving the public sector. This work force is reported to be divided uniformly across the country. Each village is served by between 6 to 10 doctors. Each doctor provides service to 250 household members in the capacity of household doctors. WHO has consistently supported capacity building of the health workforce. Both men and women are employed as health care providers, which indicate that gender equity is respected by the government. This robust health system and workforce distribution is the backbone of the health care delivery system in the country.

Structure of National TB Control Program

The National TB Control Program department in the Ministry of Public Health is responsible for implementing the TB prevention, care and control services. The Central Medical Warehouse (CMW) is charge of logistical support.

The NTP coordinates the development of policy and planning, organization of TB services, technical support, communication and international partnership activities. The NTP has a clearly defined hierarchical system from central to peripheral level.

Figure 2.Structure of National TB Control Program



TB services are delivered through the central TB preventive Institute, the provincial TB preventive Institutes, provincial TB hospitals and 210 city/county TB preventive institutes and a network of 367 microscopy centers.

The overall management of TB prevention, care and control services is implemented at Central, Provincial and County levels.

Central level

The Central TB Preventive Institute (CTPI) serves under the NTP as a technical and methodological supervisory institute which takes responsibility for prevention of TB, TB patients care, external quality assurance (EQA) and TB research.

The CTPI provides technical support to the NTP through its departments of TB clinical research, TB prevention, monitoring and evaluation (M&E), internal medicine, surgical, pediatric, Koryo medicine, National TB Reference Laboratory (NRL), pharmacy, X-ray and administration.

CTPI has 100 beds for providing treatment services for complicated pulmonary TB cases, extra pulmonary TB (EPTB) and pediatric cases.

The surgical department performs operations for complicated cases which require surgical intervention. Patients with severe complications and adverse drug reactions are provided hospital care and support by the internal medicine department until ambulatory treatment is possible.

The CTPI develops, updates and reviews various guidelines necessary for the implementation of the NTP and training materials to address the gaps in implementation.

The CTPI collects and analyses the quarterly reports on TB case notification, conversion, outcome, program management and logistics received from the provinces.

All collected reports are compiled and sent to the MoPH.

The NTP organizes review meetings with central and provincial program responsible persons to disseminate the results.

The Supervision department in the CTPI conducts monitoring and evaluation visits to the provincial and country/district levels at least four times a year, and submits the report reflecting the aggregated results and comprehensive resolutions to the MoPH.

The TB clinical research center of CTPI is responsible for performing research project on new science and technology in response to up-to-date medical development in order to improve the prevention, diagnosis, treatment and case management after completion of treatment and for building up assurance of science and technology to solve problem in field site.

In addition CTPI is responsible for implementation of operational research to find gaps in programmatic activities and guide policy decisions for management and planning of TB care and control services in the country.

The research activities however are hindered by the limited funds, inappropriate infrastructure and human resources to conduct research.

The National Reference Laboratory (NRL) is part of the CTPI and is responsible for implementing quality diagnostic microscopy services and for performing culture and drug susceptibility testing (C&DST) and molecular tests for the diagnosis of MDR-TB.

It also takes responsibility for EQA of the provincial level laboratories as per WHO recommendations, including the Regional TB Laboratories (RTL).

The TB preventive department is responsible for conducting activities aimed at creating awareness and education about prevention of TB infection and assessing the awareness level of general population on TB, developing posters and charts for disseminating TB messages, and mobilizing community and civil society to support TB care and support services.

Provincial level

The Provincial TB Preventive Institutes (PTPI) are situated at the Provincial levels, and are the technical and supervisory institutes in charge of preventing TB, organizing laboratory and treatment services, EQA, M&E and operational research in their respective Provinces.

As the provincial level management unit, the PTPI submits reports regularly with regard on notification of patients, sputum conversion, treatment outcome and program management in the respective province to the CTPI, and takes responsibility for M&E (supervision, recording and reporting, analysis and evaluation of data) and training for the respective Province.

The PTPIs have departments of TB prevention, internal medicine, surgery, pediatric TB, Koryo medicine, laboratory, pharmacy, X-ray, administration and in some places a Regional TB Laboratory (RTL).

Some PTPIs provide the hospitalized care to the patients with the criteria for admitting patients same as the one at the CPTI.

The concerned staff at the provincial level constitutes the provincial level of the NTP, which reviews and revises the TB control program activities through quarterly and annual review meetings.

The supervision department in the PTPI conducts monitoring and evaluation visits to the city and country/district level at least twice a year, and submits the report reflecting the

aggregated results and comprehensive resolutions to the MoPH.
A Regional TB Laboratory has been established in South Hamgyong and another Regional TB Laboratory will be established in North Hwanghae province by the end of 2017 to conduct C&DST for the diagnosis and follow up of DR-TB cases.

Provincial TB Hospital (PTH) is operational to hospitalize TB cases with severe medical conditions and complications who need intensive TB care and surgical interventions.
PTH is the provincial TB medical care facility to deal with TB patients whose medical conditions could not be managed by capacity of county TB sanatoria.
And the PTH also provides the hospitalized care the confirmed MDR-TB patients.

City/County (District) level

The City/County (district) TB preventive institute (cTPI), being affiliated to the health bureau of City/County (district) Peoples' Committee, plays a role as the Basic Management Units of the NTP.
MoPH has integrated former TB section in the city/county (district) people's hospital and city/county (district) TB sanatorium into the independent city/county (district) TB preventive institute since the second half of 2017, for the purpose of further strengthening unified and integrated management system to improve the effectiveness of TB program implementation.
The cTPI is functional as the peripheral specialized and unique TB management health facility in the respective cities/counties (districts). cTPI is responsible for overall TB control activity planned at the peripheral level, including TB program management, recording and reporting, treatment, prevention, health education, capacity building of human resources, drug management, supervisory visit on DOT centers. The laboratories in the prevention department and in the treatment department also act as microscopy centers for the diagnosis and follow-up services.
cTPI maintains TB forms and registers such as quarterly report on program management, TB register, laboratory register, chemoprophylaxis register, etc.
It also organizes health education and IEC activities to improve the awareness of community on TB.
The Director of cTPI takes responsibility for the county-wide TB control activities.
The prevention department of cTPI offers the diagnosis service including sputum smear microscopy and CXR, register confirmed TB cases, and refer cases back to their respective Ri/Dong clinic (or polyclinic, hospital) for ambulatory treatment under direct observation.

TB suspects found in the outpatient ward of city/county (district) hospital are sent to the cTPI for the confirmation.

Confirmed TB cases at the PTPI or CTPI as well as at cTPI are registered in the prevention department of respective cTPI.

In addition, it takes responsibility for conducting examination of contacts of smear positive cases, registration of persons eligible for chemoprophylaxis, referring confirmed cases to Ri/Dong clinic.

The cTPI makes quarterly reports on notification of TB cases, sputum conversion, treatment outcome, chemoprophylaxis and program management and submit to their respective PTPI.

It also conducts supervisory visits to Ri/Dong level every quarter and organizes the technical training for Ri/Dong level health staff.

Serious TB cases with complications and/or adverse reactions, and smear positive TB cases who need the admission to the in-patient ward, are given hospitalized care in treatment department of cTPI.

Besides the treatment department of cTPI has the wards dedicated for MDR-TB suspects and patients.

Ri/Dong level

All Ri/Dong clinics (Ri hospitals, polyclinics) take responsibility for identifying TB suspects, registering them and referring them to the cTPI for the confirmation.

The ambulatory care of confirmed TB patients is supervised by Ri/Dong TB doctors who give a instruction to volunteers and assigned family members being responsible for DOT.

The Ri/Dong clinics also conduct the retrieval actions for the defaulters and refer TB patients on the treatment to cTPI for their follow up test according to the timetable for follow up tests.

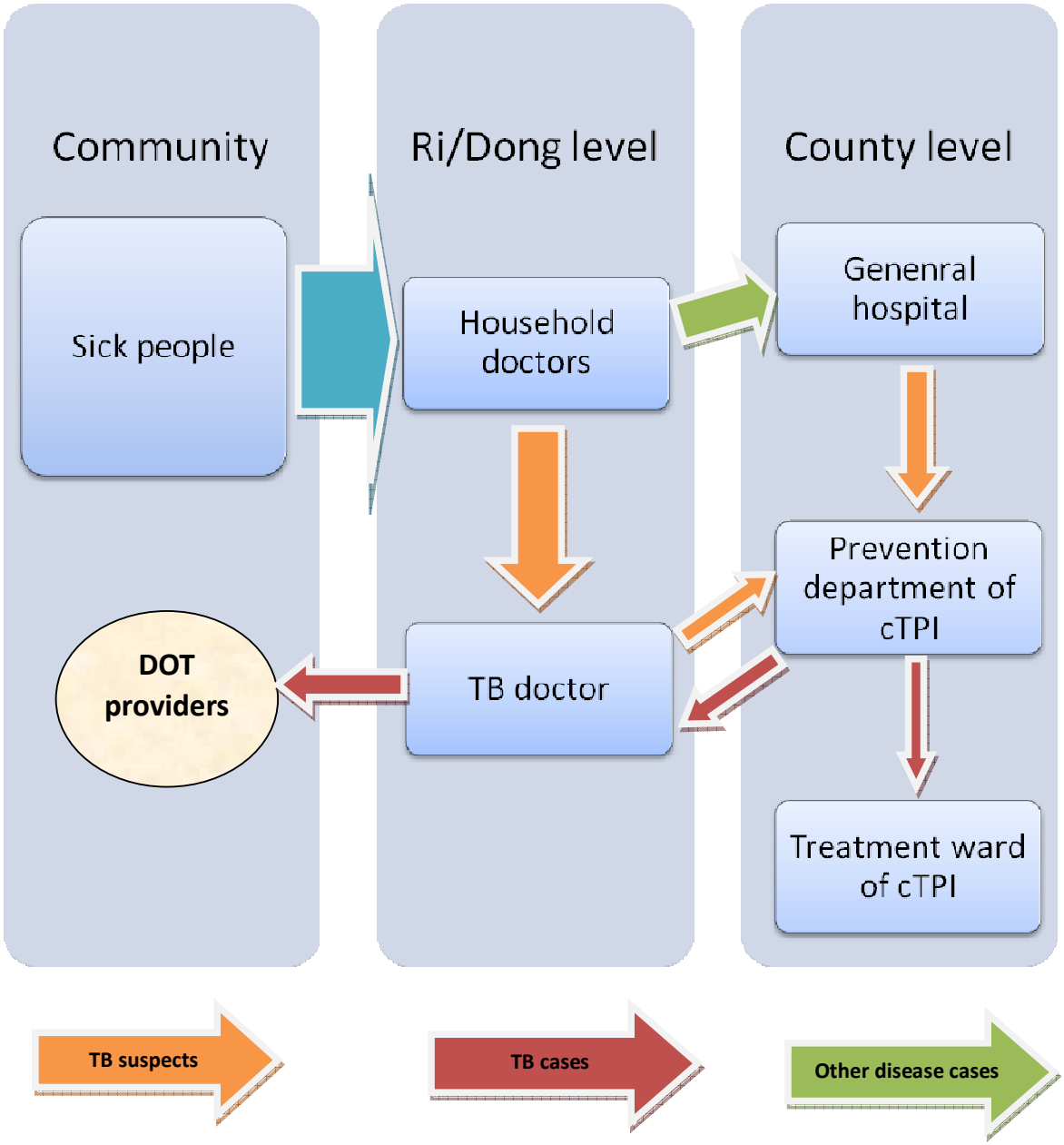
The contact tracing is done by Ri/Dong health targeting the family members of smear positive cases and suspects among family members are sent to cTPI for the confirmation.

The Ri/Dong clinics keep and maintain the chemoprophylaxis card.

The anti-TB drugs are supplied to Ri/Dong clinics from the pharmacy of cTPI.

The Ri /Dong clinics take responsibility for IEC activity and health education on TB prevention, care and control for TB patients, their families and communities.

Figure 3: Patient flow at Primary Health Care level



TB Burden

Estimated Incidence, Prevalence and Mortality

Incidence is defined as the rate of new and relapsed cases of TB arising in a given time period, usually a period of one year. The incidence is an estimate based on notification data and other related factors. For the Global TB Report, annual estimates of incidence are calculated for countries by a team of experts, facilitated by the WHO.

Prevalence is defined as the proportion of all cases of TB at a given point in time.

The Mortality rate is defined as the rate of deaths caused by TB during a given time period, usually a period of one year. The latest revision of the International classification of diseases (ICD-10), defines mortality from TB as the number of deaths caused by TB in HIV-negative people.

The estimates of TB burden in DPRK are shown in the table below which are based on modeling by the WHO.

Table 4: Estimates of TB Burden (Source: WHO Global TB Reports)

	Mortality				Prevalence				Incidence			
	Number (*1000)	Range (*1000)	Rate	Range	Number (*1000)	Range (*1000)	Rate	Range	Number (*1000)	Range (*1000)	Rate	Range
2012	2.2	2.1-2.4	9	8.6-9.5	130	34-280	511	139-1120	100	92-110	409	373-447
2014	5	2-9.3	20	7.9-37	140	38-300	552	150-1210	110	100-120	442	412-473
2015	15	10-22	61	40-87					141	109-178	561	432-706

Incidence of MDR-TB

The small scale of TB drug-resistance survey was done using Gene-Xpert MTB/RIF in North Hwanghae Province in 2014. Reportedly 2.2 % of new cases and 16.3% of previously treated cases are Rifampicin-resistant cases.

Thereafter, all Rif resistant samples were subjected to C&DST for four First Line Drugs (FLD). The rate of MDR-TB among new cases was found to be 1.9% and in retreatment cases 15.3%. These figures are in line with estimates derived from the earlier WHO modelling, and the estimate of patients developing MDR-TB annually amongst the notified pulmonary TB patients remain approximately the same, i.e. around 3,900 in 2014.

According to the Global TB Report 2016, WHO estimated approximately 4,600 (2,600 – 6,500)

MDR-TB patients develop annually in the country, through the nation-wide DRS is planned to be undertaken to get the representative DR-TB profile for the country.

Epidemiological Analysis

Case Notification

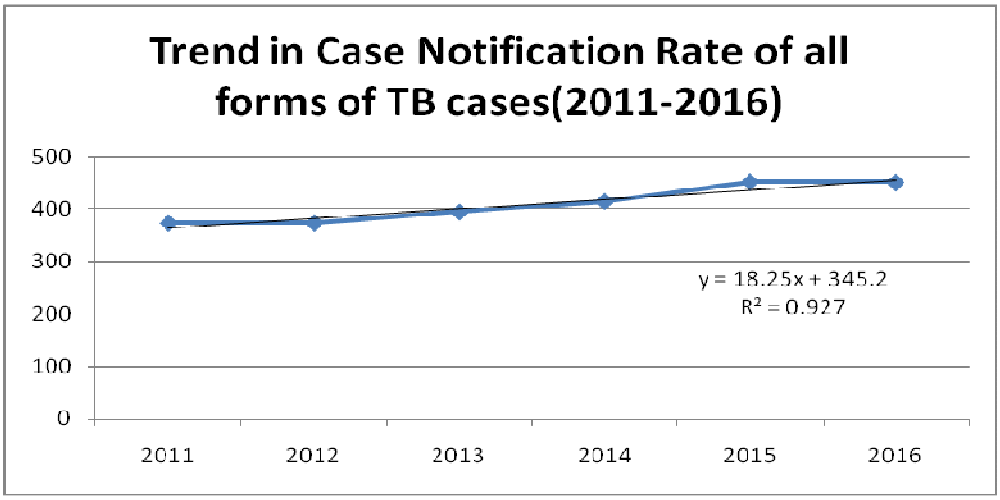
Analysis of trends in case notification of all forms of TB

The case notification rates (CNR) of all forms of TB (new and relapse) from 2011 to 2016 are presented in the table below. The estimates for incidence for DPRK were revised under the guidance of the WHO at least twice – the first time in 2007 following a sub-national ARTI survey and again in 2012 when case notification exceeded 100% of the estimated incidence. These substantial changes make analysis of the trends in TB incidence difficult, and it is likely that TB incidence is actually increasing over time, although active case finding and improved recording and reporting are certainly contributing to the increases in notification.

Table 5: Case notification rate of new and all forms of TB from the year 2011 to 2016

Year	Population (thousand)	All forms of TB cases (New + relapse)	Case Notification Rate of all	All TB cases newly notified	Case notification rate of all TB cases
2011	24,489	91,433	373	99,071	404
2012	24,625	91,885	373	99,399	404
2013	24,759	97,665	394	104,912	424
2014	24,895	103,045	414	110,290	443
2015	25,030	112,840	451	120,722	482
2016	25,030	112,606	450	120,323	481

Figure 4: Case notification rate for all forms of new and relapse cases of TB, 2011-2016



As shown in Figure 4, linear model created on the graph shows a very strong relationship between the model and the registration data given the R^2 value of 0.93, as well as the clear upward trend of case notification rate of newly notified TB cases. The most marked feature in case notifications is the year on year increase in the case notification rates. Countrywide expansion of DOTS was achieved by 2003. The case notification rates (all forms) increased from 40 per 100,000 populations in 2011, when the Global Fund grant started, to 481 per 100,000 populations in 2016.

This is explained by the fact that there have been intensified efforts for active case finding.

The average increase rate in CNR for all forms of new TB cases notified is estimated to be 12%. Notification of the different types of TB was calculated to observe trends, with Table 6 below showing the notified numbers of the different types of TB and Figure 4 the trends graphically.

Table 6: Number of notified new cases by different type

Year	Pop figure (thousands)	New Case notification	New pulmonary SS+	New pulmonary SS -	New Extra Pulmonary	Relapse
2011	24,489	91,433	31,279	37,457	16,828	5,869
2012	24,625	91,885	31,904	35,959	17,321	6,701
2013	24,759	97,665	33,595	38,838	18,158	7,074
2014	24,895	103,045	34,622	41,423	18,587	8,413
2015	25,030	112,840	37,343	45,692	20,758	9,047
2016	25,030	112,606	36,289	45,201	21,345	9,771

Figure 4: Trends in notification by type

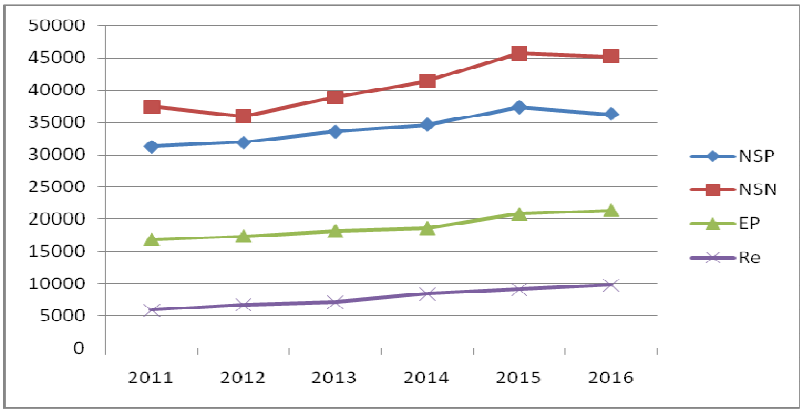


Table 7: Proportion of Case notification by type out of all forms of TB

Year	Newly notified cases	New pulm SS+	New pulm SS-	New EP	Relapse	New Pul SS+ %	New Pul SS- %	EP %	Relapse %
2011	91,433	31,279	37,457	16,828	5,869	34.2	41.0	18.4	6.4
2012	91,885	31,904	35,959	17,321	6,701	34.7	39.1	18.9	7.3
2013	97,665	33,595	38,838	18,158	7,074	34.4	39.8	18.6	7.2
2014	103,045	34,622	41,423	18,587	8,413	33.6	40.2	18.0	8.2
2015	112,840	37,343	45,692	20,758	9,047	33.1	40.5	18.4	8.0
2016	112,606	36,289	45,201	21,345	9,771	32.2	40.1	18.9	8.7

As shown in Figure 4, the trends in notification by the different types of TB are similar to those seen for all forms of TB. The case notification by type has been steadily increasing over recent years. Particular note should be taken of the increased number of EPTB cases for which diagnosis would have been challenging without the improved capacity of health workers and health facilities. Although the ratio of smear positive to smear negative PTB cases has been steady over the past years, the fact that the smear negative PTB CNR was slightly higher than smear positive TB CNR may be due to the increase in active case finding activities implemented by the NTP in the recent years.

Retreatment cases

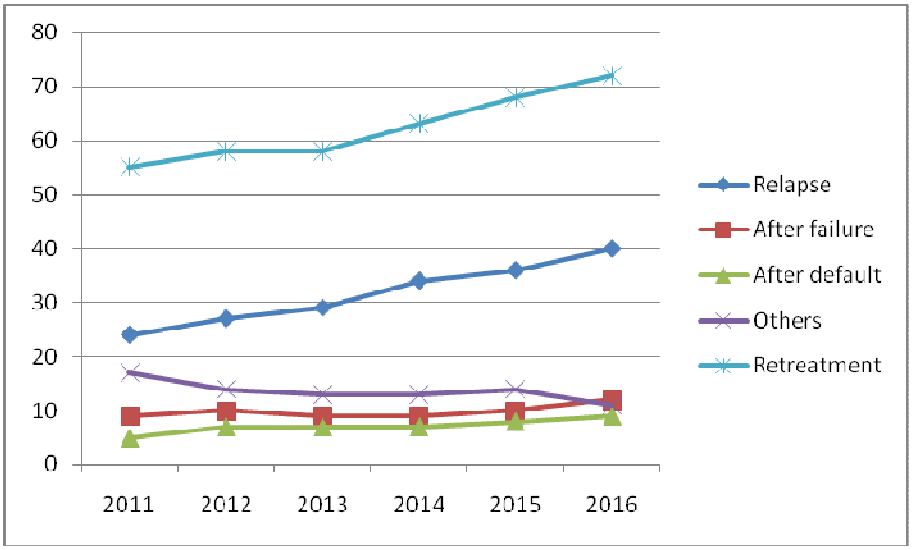
In order to capture the actual trend of retreatment TB cases by type, case notification rates by type have been tabulated below.

Table 8: Case notification rate of Retreatment TB cases

Year	Relapse	After failure	After default	Others	Retreatment
2011	24	9	5	17	**55**
2012	27	10	7	14	**58**
2013	29	9	7	13	**58**
2014	34	9	7	13	**63**
2015	36	10	8	14	**68**
2016	40	12	9	11	**72**

As presented above, all types of retreatment TB CNR was ranging mostly between 55 and 72. The analysis of all types of retreatment cases shows that maximum increase in notification numbers, rates and percentage of all retreatment cases is due to relapse cases.

Figure 5: Trends in case notification rate of Retreatment case



The proportion of relapse type out of total retreatment TB cases increased from 43.6% in 2011 to 56% in 2016. In general, CNR of all types of retreatment TB cases has shown to be at steady status over the past several years. There has been a downward trend in the notification of 'others' while at the same time there is a steep increase in the notification of relapse in the same period. Especially noteworthy is downward trend shown in the CNR of 'others' type of retreatment cases may be explained to the improved DOTS Program. The

increase in notification of relapse may also be related to the quality of DOTS kit.

Pediatric TB

At the national level, in 2016, there were an estimated 102,835 case notification of new TB cases, of which 6,085 were children. It shows about 6% of all new TB cases is children.

Out of all pediatric TB cases, TB case aged under 5 years covers 18% and aged 5~14 covers 82%. The data from the Global TB Report 2016 shows that the proportion of pediatric TB cases out of all new TB cases is around 10% globally, and regularly exceeds this percentage in countries with high TB incidence. This indicates that there is comparatively low detection and notification of TB among children in the country, especially in the 0-4 age group.

Analysis of Treatment Outcome

The treatment success rate of smear-positive TB cases has been maintained above 90% since 2011.

Analysis of treatment outcomes of notified new smear positive TB case from 2011 to 2015 is given in the Table 9.

Table 9: Treatment outcomes NSP in number and % from 2004 to 2015

Year	Total	Treatment success			Died		Failure		Defaulted		Transfer-out	
	notified	Cure	T/T completed	%	No.	%	No.	%	No.	%	No.	%
2011	31,279	27,290	982	90.4	833	2.7	1,156	3.7	656	2.1	362	1.2
2012	31,904	28,101	901	90.9	780	2.4	1,152	3.6	661	2.1	309	1.0
2013	33,595	29,368	1109	90.7	941	2.8	1223	3.6	637	1.9	317	0.9
2014	34,622	30,034	1199	90.2	911	2.6	1354	3.9	747	2.2	377	1.1
2015	37,343	32,327	1193	89.8	900	2.4	1531	4.1	979	2.6	413	1.1

As can be seen from the table, treatment success rate (which includes cured and treatment completed) has been consistently high and above the global target set at 85%.

The average death rate during the period 2004 to 2015 has been just over 1.5%. A very important factor is the low level of default indicating high adherence to the treatment.

SWOT Analysis

During the development of the NSP, the NTP performed an analysis of the Strengths, Weaknesses, Opportunities and Threats to the program (SWOT-Analysis) based on the results of the recently conducted Joint Monitoring Missions (JMM) in May 2017. The SWOT analysis sought to clarify the situation of the NTP with respect to **internal** factors (Strengths, Weaknesses) as well as **external** factors (Opportunities, Threats), over which the NTP has limited control.

The JMM identified the following **Strengths**:
DPRK has committed itself to the End TB Strategy, 2015 and the Sustainable Development Goals of the United Nations (UN). The country's official representative signed the Call to Action from the "Ministerial Meeting: Ending TB in the South East Asian Region" in New Delhi, in March, 2017. The DPRK has thereby committed to increase the government budgetary contribution to TB control. In the coming months the Moscow Ministerial Conference due in November, 2017, and the UN High Level Meeting on TB in 2018 will maintain the world's attention on TB, which, since 2015, has become the world's biggest infectious killer.
Since the 1950s, DPRK has established a nationwide network of facilities to diagnose and treat drug susceptible TB. The household or section doctor system is, effectively, a nationwide active case finding system. Staff appear well-trained, capable, and hard-working, although lacking access to recent technological advances. A National Reference Laboratory has been set up. A national prevalence survey (NPS) has been successfully conducted, with finalized results pending. DPRK has succeeded in winning support from the Global Fund, and has been implementing the grants thus won since 2010. International non-governmental organisations (NGOs) have been engaged, notably the Eugene Bell Foundation and Christian Friends of Korea (CFK). Treatment success has been reported as around 90% for all new cases for the last 15 years, 83% for re-treatment cases, and 80% for MDR-TB cases. Of 37 major recommendations from 2014, 19 have been completed, 11 are in progress.

Weaknesses were described by the JMM as follows:
DPRK already has the highest notification (463/100,000) and estimated incidence rates in the world for a country without a significant HIV problem. The current incidence estimate of 561/100,000 population will likely be revised when data from the 2016 National Prevalence Survey (NPS) is applied. Notifications have been rising steadily since the 1990s due to increased coverage and, probably, increased incidence. The major underlying causes of such a high notification rate are likely to be undernutrition, an ageing population, smoking (42% in males), and inadequate logistic supply to health system. Case detection is uncertain, but it is currently (June 2017) fixed at 80% in the WHO model. Nevertheless,

there is highly probable under-diagnosis, especially in children under 5 years of age. In addition, there is likely over-diagnosis in all ages owing to the low specificity of X-ray examination for TB, especially when the out-dated fluoroscopic equipment, found in most counties, is used. Over 67,000 HIV tests were carried out in 2014, all of which were reported negative. The review team was repeatedly informed that there is no HIV in DPRK nationals. As many as 4,600 cases of multi-drug resistant TB (MDR-TB) may be occurring annually. No children have been diagnosed and treated for MDR-TB. TB control efforts are seriously affected by factors that are internal (lack of financial resources, vehicles, and fuel supplies, limited access to mountainous areas, floods, etc) and external (sanctions regimes and isolation policies applied by major economic powers). It is clear that sanctions are impacting negatively on the nutrition, general health and TB burden of the population.

The main challenge to TB control is the extremely high, and rising, notification rate. While the treatment success rate has been reported to be around 90% for nearly 20 years, and case detection around 80-90%, these data are inconsistent with such high notifications. One possible reason is that the burden of TB is significantly larger than currently estimated. The preliminary results from the NPS indicate that it is indeed higher. There are insufficient financial resources to meet all TB control needs and much of the equipment is old and out-dated. This is especially true of the X-ray machines that mostly depend on fluoroscopic methodology. Serious supply problems for reagents, drugs and equipment are being experienced due to sanctions regimes. On 1st April, 2017 there were sufficient drug stocks for new cases in the country for only 12 weeks, enough Category II drugs for just two months, and no paediatric drugs including some stock-outs of INH for IPT. A shipment of first-line drugs (FLD) sufficient for 50,000 cases was expected in July 2017. The newly formulated pediatric TB medicine was ordered, but it had not arrived at the county by the time of JMM. The province of Jagang, which is not supported by the Global Fund because of access restrictions, experienced stock outs at the end of Quarters 1 and 2 in 2016, but had sufficient stocks of FLD during JMM visit – procured by WHO for 2017. Laboratory reagents being used for smear microscopy were out of date. New diagnostic reagents had been sent, but the kits contained a counter-stain that technicians have not been taught to use. While five of the new molecular technology GeneXpert machines were in the country, they were unusable because of a lack of cartridges and backup power systems. Equipment is not being regularly maintained. Diagnosis of drug resistant TB was therefore on hold because of lack of cartridges and laboratory reagents for phenotypic testing at the NRL.

Intermittent treatment, which is no longer recommended by WHO, is still provided in the continuation phase for drug sensitive TB. Category II treatment is still in use, while this, too, is contra-indicated by WHO. There have been instances of insufficient supply of isoniazid preventive therapy (IPT) for household contacts. MDR-TB management responds to drug and

reagent availability, not to patient need. As a result, in 2016, only 17% of the estimated total number of MDR cases occurring that year was started on treatment, including those treated through the Eugene Bell Foundation. The non-treated cases are at high risk of dying but meantime act as sources for the further spread of MDR-TB in the community. The monitoring and evaluation system relies on paper systems and still uses the pre-2013 definitions.

The following **Opportunities** were detected:
The government has committed to increase its financial support to TB control. The Global Fund has increased its allocation for the 2018-2021 grant, compared to the current grant. The household doctor system is ideal for community-based active case finding. Electronic, case based data collection systems could readily be applied in DPRK. Electronic stock quantification tools could replace the existing Excel-based system and provide early warning of any impending stock-outs.
A health management information system (HMIS) is planned, based on the national intranet, which could provide fast availability of all necessary TB information in the field. The short-course regimen for MDR-TB, recently approved by WHO, could greatly reduce MDR-TB treatment costs and improve management.

Threats
An important threat to the performance of the NTP is the risk of stock-out for both drugs and diagnostic supplies, mostly due to external factors related to the sanctions regime. While these factors are largely beyond the control of the NTP, intensified collaboration with domestic and international partners, stakeholders and authorities will help to alleviate this threat.
In addition, the NTP is still largely dependent on external financial resources. Therefore, there is a need for continued collaborative financial planning with all partners and stakeholders. In addition, the NTP will make every effort to increase the availability of domestic funding of TB control activities.

Strategic Framework

Vision: DPR Korea free of Tuberculosis as a public health problem

Goal: To end the TB epidemic in DPRK, indicated by a reduction of incidence of 50% by 2025, and 80% by 2030 (compare to the result of National TB Prevalence Survey 2015/2016)

Objectives

1. Scale up services for diagnosis of TB to achieve case detection rate of 95% with the baseline identified by results of National TB Prevalence Survey.

2. Ensure the quality of services for TB treatment and maintain a treatment success rate of more than 90%.

3. Expand access to drug resistant TB diagnosis and treatment services to reach more than 90% of newly occurring MDR-TB cases including pediatric cases by 2021, and achieve treatment success rate of at least 70%.

4. Engage with civil society, NGOs, key affected populations (including children), and other health programs for TB prevention, care and control, and sustain the existing social protection measures for TB affected families.

5. Strengthen operational research and innovations for backing up TB control.

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There are 7 strategic directions for TB control identified in the National Strategic Plan and they align closely with the three pillars of the END TB Strategy Framework

Pillar 1: Integrated, patient-centered care and prevention

Strategy 1: Strengthen the nation-wide TB diagnosis network and actively find the missing TB cases

Strategy 2: Improve the quality of treatment services through patient-centered integrated services focused on ambulatory care and social support

Strategy 3: Rapid expansion and successful implementation of Program Management of Drug-resistance TB to the nation-wide scale

Strategy 4: Improve the quality of Monitoring and Evaluation approaches and strengthen TB surveillance system

Pillar 2: Bold policies and supportive systems

Strategy 5: Foster multi-sectoral approaches with other government authorities, civil society, NGOs, other health programs including nutrition program and health facilities out of NTP to improve the prevention, diagnosis and treatment of TB

Strategy 6: Contribute to Strengthening Health System focused on improving the quality of patient care through Primary Health Care approach

Pillar 3: Intensified research and innovation

Strategy 7: Promote TB research including clinical, operational and development research project for effective control of TB.

Strategy, Interventions and Activities

The strategies are divided into specific intervention areas under which the planned activities are described. The planned activities are detailed in the work plan and budgeted operational plan for implementing in a phase wise manner to achieve the Objectives of this NSP and work towards the Goal.

The key approaches to be taken in pursuing the program objectives are described in the following sections.

Strategy 1

Strengthen the nation-wide TB diagnosis network and actively find the missing TB cases

Since 2003, National TB Control Program (NTP) established nationwide network for TB smear microscopy, and conducted diagnosis of TB patient through microscopy in combination of CXR. The case notification rate (CNR) of TB patient has been increased and at the end of 2016, it was 463 per 100,000 populations. According to the 2016 Global Tb report, the incidence rate of TB patient was estimated as 561 per 100,000 populations, which means that nation-wide diagnosis network is missing the considerable number of TB patients.

Interventions and actions planned in Strategy 1 aimed at maintaining high case notification rate of all forms of TB and improving active case finding for detection of missing TB patients.

One key focus of this strategy will be the introduction of a new diagnostic algorithm that mandates the routine use of Chest X-ray and Gene Xpert for smear-negative presumptive TB cases, as well as for specific risk groups, such as children.

In addition, this strategy will introduce the **routine testing of presumptive or diagnosed cases with risk factors for MDR-TB with Gene Xpert**.

To implement this new diagnostic algorithm, in focus of the interventions and actions is to develop the National TB Laboratory Strategic Plan and improve the capacity of laboratory as per the strategic plan, and to improve diagnosis of pediatric TB patients, smear negative TB patients and extra-pulmonary TB patients by intensifying the capacity of X-ray test, Gene Xpert and other auxiliary examinations and to strengthen human capacity for diagnosis of TB as well.

Another key focus is to strengthen active case finding to provide early detection and treatment of missing patients so as to interrupt the transmission of TB infection in the community. The capacity of culture & drug susceptibility test(C&DST) and molecular diagnosis test will be expanded rapidly to meet the country need in the diagnosis of TB and MDR-TB.

The uninterrupted supply of reagents and consumables for smear microscopy, fluorescent microscopy, C&DST, Gene-Xpert test and LPA will be ensured and quality of laboratory service will be improved through regular QC and EQA.

Expected result

Since 2015, the WHO-recommended External Quality Assessment on smear microscopy was introduced, and the implementation of the EQA has been expanded to all parts of the country by the 1st quarter of 2017. According to the quarterly report generated by the National TB control Program, 90% of laboratories showed the good performance during EQA which means that quality of smear microscopy service has already reached a high level over the country. Given the high percentage of laboratories showing good performance, the NTP decided to introduce the fluorescent microscopy to the cTPIs in the regions with high-burden of TB and establish the dual EQA system on Z-N staining and auramine staining.

Sariwon Regional TB Reference Laboratory (RRL) that is being under construction, and Hamhung Regional TB Reference Laboratory (RRL) will be fully functional and the EQA on these RRLs by the National TB Reference Laboratory will be strengthened. Besides the NPT plans to additionally establish 2 RRLs in South Pyongan Province and North Hamgyong province to provide the service of C&DST center per 5 million population.

A network of Gene-Xpert and LPA will be established and operational to cater for the full demand in the diagnosis of TB & MDR-TB over the country. Gene-Xpert will be available at all counties, and 5 TB reference laboratories and 8 PTPIs will conduct quality-assured LPA tests.

Active case finding will be strengthened in risk groups identified by the NTP, and TB diagnostic services will reach TB patients who couldn't have been detected through the passive case finding.

1.1 **Policy making, planning and dissemination**- National TB laboratory strategy will be developed for sustainable development of the TB laboratory capacity and action plan will be made under the strategy. To ensure the quality-assured microscopy of the network of TB laboratory, TB laboratory guideline, SOP and the diagnostic algorithm will be updated and published to fully operationalize the EQA approaches including on-site evaluation, blind-rechecking and panel testing over the whole country and to introduce the new technique such as fluorescent microscopy and Gene-Xpert to the field.

1.1.1 Workshop for development of New Diagnostic Algorithm and National TB laboratory Strategy

1.1.2 Development, printing and dissemination of New Diagnostic Algorithm and National TB laboratory Strategy

1.1.3 Development of draft of revised TB laboratory guideline

1.1.4 Workshop for revising TB laboratory guideline

1.1.5 Printing and dissemination of revised TB laboratory guideline

1.2 **Strengthening the laboratory network of smear microscopy and fluorescent microscopy** - Binocular microscopes have been provided to all TB laboratories of the country under the GF grant to contribute to diagnosis of TB patients, and fluorescent microscopes will be also provided to the cTPIs in TB high-burden city/county. As a result, the dual laboratory networks (Z-N staining and Auramine staining) will be functional and

accordingly the NTP will standardize and strengthen the EQA approaches. Currently the field visit to the lower level laboratories being conducted on the quarterly basis guarantees the regular on-site evaluation, blind-rechecking and panel testing. Therefore, measures for the field visit will be taken to ensure the successful implementation of EQA. Reagents, consumables and star-up kits for the TB laboratories will be provided regularly corresponding to the need of peripheral level. The PSM system for provision of equipment and supplies as well as maintenance of all equipment will be strengthened together with the drug procurement system in collaboration with the PSM section of the MOH (see Strategy 2).

1.2.1 Provision of GDF diagnostic kit for smear microscopy

1.2.2 Provision of auramine staining kit for fluorescent microscopy

1.2.3 Provision of sputum cups for microscopy

1.2.4 Provision of additional start-up kit

1.2.5 Provision of slide boxes for the blinded rechecking

1.2.6 Maintenance of all existing microscopes

1.2.7 Support for field visit to TB labs for EQA

1.3 **Expanding the coverage of Gene-Xpert test** – At the CTPI and 7 PTPIs the Gene-Xpert test will be available by the end of 2017. And the Gene-Xpert will be additional installed at 5 PTPIs in the strategy period. Considering the WHO recommendation on use of Gene-Xpert at peripheral level, the NTP will provide Gene-Xpert machines to cTPIs of Pyongyang city as a pilot for the establishment of Gene-Xpert network in a province, and based on the experience and lessons learnt during the piloting will roll out Xpert service to all cTPI within a short term. The rapid expansion will bring about a great change in the landscape of diagnosis of smear negative TB patients, extra-pulmonary TB patient, pediatric TB patient and MDR-TB patient and the NTP plans to conduct the activities for full operation and maintenance of Gene-Xpert.

1.3.1 Provision of Gene-Xpert, power backup system (solar power system), printer for 5 PTPIs

1.3.2 Provision of Gene-Xpert, power backup system (solar power system), printer for 210 cTPIs

1.3.3 Procurement of cartridge for Gene-Xpert

1.3.4 Maintenance of Gene-Xpert

1.4 **Strengthening capacity of C&DST centers** - Though NRL and Hamhung RRL are in operation, the capacity is limited and there remain some challenges in expansion of PMDT to the whole country. Therefore the NTP plans to expand the infrastructure of the NRL and procure the additional key equipment to increase the capacity of the laboratory and ensure the quality-assured diagnosis. Appropriate measures will be taken to maximize the capacity of Hamhung RRL and Sariwon RRL. 2 RRLs will be established in South Pyongan province and North Hamgyong province and accordingly the laboratory equipment will be procured and installed for full operation. The NTP will prioritize the procurement and installation of LPA in 4 RRLs and 8 PTPIs to diagnose MDR-TB patient in timely manner and moreover provide 1st and 2nd line DST service for introduction of H mono/poly- resistance treatment and short term regimen for MDR-TB treatment.

As the PMDT will expand to nation-wide scale, the specimen transportation system will be strengthened to transport the specimen for culture and 1st and 2nd-line DST from lower level to C&DST centers and proper measures will be taken to offer the timely diagnosis and follow-up tests for MDR-TB cases.

The uninterrupted supply of reagents, consumables and other necessary materials for operationalization of TB reference laboratory will be ensured.

While conducting activities to expand the capacity of NRL, the NTP will expedite the process for the NRL to get the international accreditation and maintain it in the close relationship with Hong Kong SNRL.

1.4.1 Expansion of infrastructure of NRL

1.4.2 Provision of additional equipments for TB reference laboratories

1.4.3 Renovation of existing laboratory at South Pyongan PTPI and North Hamgyong PTPI to provide C&DST service

1.4.4 Provision of essential equipment for 2 newly-renovated RRLs

1.4.5 Provision of LPA for 4 RRLs

1.4.6 Provision of equipment set for LPA operation at 8 PTPIs

1.4.7 Provision of reagents and consumables for LPAs (drug susceptibility test for FLDs and SLDs)

1.4.8 Provision of reagents and consumables according to timeframe of establishment of RRL

1.4.9 Maintenance of 5 C&DST centers (NRL and 4 RRLs)

1.4.10 Provision of solar power system for 4 RRLs

1.4.11 Provision of vehicles for CTPI, PTPIs and PTHs to transport specimens and field visit for EQA

1.4.12 Supply of fuel and maintenance of vehicles for transportation of specimen

1.4.13 Preparation of NRL to get international accreditation

1.4.14 External TA for strengthening the capacity of C&DST

1.5 **Strengthening diagnosis of pediatric TB, smear negative TB and extra-pulmonary TB** - Notification of smear negative TB and extra-pulmonary TB takes the large proportion in the notification of all forms of TB, therefore it is critical for improving the quality TB case management to ensure the accurate diagnosis and timely initiation of treatment for those patients. In particular, there still remains the cumbersome issue for the program due to the difficulties in the diagnosis of pediatric TB and the general situation in which the pediatric TB patients are referred first to the pediatric section unlike the adult TB cases. Currently, among all notified TB patients, nearly 6% of patients are pediatric TB patients and the NTP aimed to further increase the proportion of pediatric TB patients among all notified TB cases during the NSP implementation period. Therefore, the NTP plans to strengthen the infrastructure of TB facilities and supply the tools to diagnose smear negative TB patients, extra-pulmonary TB patients and pediatric TB patients. Procurement of X-ray machines, ultrasound machines, instrument of gastric lavage, nebulizer, bronchoscope and tuberculin will be done for all TB facilities to ensure the quality-assured diagnostic service for all forms of TB patients. For the accurate confirmation of extra-pulmonary TB, the CTPI and PTPIs will be equipped with the facility for patho-histological tests. The efficacy of additional tests such as IGRA for use in the diagnosis of childhood TB will be assessed in operational research projects. TA for development of revised guidelines for diagnosis and management of childhood TB is expected for late 2017, and the National Childhood TB guidelines and the TB component of the National IMCI and MCH guidelines will be updated to reflect the latest diagnostic algorithms for TB in children as recommended by WHO and other international organizations.

1.5.1 Provision of portable digital X-ray machines for all cTPIs

1.5.2 Provision of power stabilizers for portable digital X-ray machines

1.5.3 Site readiness for installation of portable digital X-ray machine

1.5.4 Maintenance of X-ray machines

1.5.5 Provision of film for X-ray machines for X-ray machines

1.5.6 Provision of developer & fixer kits for X-ray machines

1.5.7 Provision of ultrasound machine

1.5.8 Provision of power stabilizers for ultrasound machine

1.5.9 Site readiness for installation of ultrasound machine

1.5.10 Maintenance of ultrasound machine

1.5.11 Provision of instrument for gastric lavage

1.5.12 Provision of instruments for induction of sputum from children

1.5.13 Provision of PPD

1.5.14 Printing and dissemination of SOP for tuberculin test

1.5.15 Provision of refrigerator for storing tuberculin in TB facilities

1.5.16 Provision of equipment for pathologic test for CTPI and PTPIs

1.5.17 Provision of reagents and consumables for pathologic test for CTPI and PTPIs

1.6 **Strengthening active case finding** - One of the priorities in the National TB Strategic Plan (2018-2021) is to provide the universal access to quality-assured diagnostic service in general population as well as risk groups without missing cases. Importantly the active case finding draws the considerable attention of the NTP to detect TB suspects among the risk groups with the high TB infection rate and incidence, and the early diagnosis for the patients in those groups is critical for the program to consolidate the success achieved so far in the area of patient detection. Currently, the NTP defined the risk groups as those working in industrial sector with high incidence of respiratory disease (coal mines, mines, cement factory, power station, etc.), children, population living in the areas of high TB prevalence and health providers working in TB units. Active case finding for staff who usually contact many people in public service sectors including restaurants and shops, is also given the importance for prevention of TB infection.

And the result of National Prevalence Survey (2015-2016) illustrated that TB incidence is high among adult smokers, the ratio of case notification rate to TB incidence is low among elderly population as compared to other age groups. Therefore, the NTP will put main emphasis on suspects finding in the age group at peripheral level.

The efficient algorithm for active case finding will be developed and the Active Case Finding Guideline will be updated and disseminated to ensure the operationalization of the algorithm in all parts of the country.

Contact tracing and TB screening by interview at Ri/Dong level, and TB screening by X-ray vehicle at central/provincial level will be strengthened. For active case finding at central and provincial level, the sustainable logistic support to CTPI and PTPIs will be provided.

To analyze effectiveness and impact of the ACF approaches, the new indicators will be adopted for M&E and ACF-related data will be regularly collected and compiled.

1.6.1 Central level workshop for updating ACF Guideline

1.6.2 Printing and dissemination of updated ACF Guideline

1.6.3 Provision of mobile diagnostic vans equipped with portable digital X-ray machines and Gene Xpert machines (one per province)

1.6.4 Provision of fuel and maintenance for diagnostic vehicles

1.6.5 Maintenance of portable digital X-ray machines and Gene Xpert

1.7 **Strengthening Human Resources** - Since the new interventions and activities are planned to improve the capacity of TB diagnosis in the strategy period, the capacity building of staff is essential to guarantee the successful implementation of the program. The training materials for each capacity building activity will be developed under the guidance of the NTP by local TB experts in line with updated national guidelines taking into account the latest recommendations from international technical partners including WHO, and used for all trainings to ensure the quality of training.

The NTP will conduct trainings for the cTPIs where the fluorescent microscopy is introduced and conduct trainings and refresher trainings on smear microscopy and EQA every year. For rolling out Gene-Xpert service over the whole country, trainings on usage & maintenance of the machine will be undertaken.

Trainings and refresher trainings for RRL staff will be conducted every year at the NRL and the NTP also will give the importance to trainings for staffs of PTPIs on international standard of transportation of specimens. Central, provincial and county level trainings will be conducted to improve the diagnostic capacity of extra-pulmonary disease. To improve the diagnosis of pediatric TB, trainings for staffs for TB facilities and pediatric section will be regularized at all level.

International workshop/ study tour and oversea trainings will be organized to learn the advanced knowledge and best practices and exchange the experience in the area of

laboratory service and management of pediatric TB and extra-pulmonary TB.

As the guideline of active case finding is updated, the training will be conducted for staff responsible for ACF at central, provincial and county level.

1.7.1 Training and refresher training of provincial level staffs on fluorescent microscopy and EQA

1.7.2 Training and refresher training of county level staffs on fluorescent microscopy and EQA

1.7.3 Hands-on trainings of RRL staffs at the NRL

1.7.4 Training for laboratory doctors of PTPIs on usage of Gene-Xpert

1.7.5 Training for staffs of county level on usage of Gene-Xpert

1.7.6 Central level training for provincial staffs on transportation of specimen

1.7.7 Central level training for provincial level staff on management of pediatric TB patient

1.7.8 Provincial level training for county level training on management of pediatric TB patient

1.7.9 Central level training for provincial level staff on management of extra-pulmonary TB patient

1.7.10 Provincial level training for county level staff on management of extra-pulmonary TB patient

1.7.11 Central level training for provincial staffs on active case finding

1.7.12 Provincial level training for county staffs on active case finding

1.7.13 Central level regular trainings for staff from CTPI and PTPIs on pathologic tests

1.7.14 Training of NRL and RRL staffs at SNRL

1.7.15 Participation in trainings and workshops organized by GLI

1.7.16 International training/study tour on management of pediatric TB patient

1.7.17 International training/study tour on management of extra-pulmonary TB patient

Strategy 2

Improve the quality of treatment services through patient-centered integrated services focused on ambulatory care and social support

NTP will systematically review the current treatment success rate of 90% and ensure that all treatment outcome results are reported in line with WHO guidelines. The treatment success rate will be maintained at more than 90%, and every effort will be made to even exceed this target during the NSP implementation period.

NTP will ensure the uninterrupted procurement and distribution of quality-assured 1st line anti-TB drugs to all drug sensitive TB patients. Regarding the WHO recommendation and in-country TB expert opinion, the NTP will shift from current intermittent regimen in Continuation Phase to daily regimen in line with current WHO recommendations[1].

In scale up of conventional DST and Gene Xpert, and provision of sufficient 2nd-line drugs, Cat II treatment will be phased out. Patients eligible for retreatment will be referred for Gene Xpert testing to determine at least rifampicin resistance, and if possible also isoniazid resistance status through First Line Drug LPA and regular DST. On the basis of the drug susceptibility profile, the standard first-line treatment regimen (2HRZE/4HR) will be repeated if no resistance is documented; if rifampicin resistance is present, the NTP's standard MDR-TB regimen will be prescribed.

The NTP has been implementing IPT mainly on those aged under 7. In the strategy period (2018-2021) the NTP will plans to wage the campaign depending on the resource availability, to provide the LTBI treatment to adult close contacts including the health care workers in TB field, adults in high risk groups and all family members of smear positive cases to substantially drop down the curve of TB epidemics.

National TB guideline will be revised and distributed to all TB facility for politically backing up the interventions and improving quality of patient-centered care and diagnosis.

The NTP will take all steps to increase the treatment success rate and provide ambulatory service not only to drug-sensitive TB cases but also to drug-resistant TB cases for patient's convenience.

The NTP will strengthen patient education on TB through health education, dissemination of hand-outs and IEC materials so that they will be encouraged to strictly adhere to the treatment.

As the ambulatory service to DR-TB cases will be introduced during the implementation of

[1] Guidelines for the treatment of drug-susceptible tuberculosis and patient care, 2017 update; WHO/HTM/TB/2017.05

this strategy, the awareness and knowledge of health care workers at Ri/Dong clinics should be improved a lot to deal with patient care. The NTP plans to improve the function and motivation of Ri/Dongs doctors to facilitate the patient-centered approaches taking the advantages of household doctor/TB doctor system established at peripheral level. (refer to Strategy 7)

Expected result

National TB guideline will be updated to reflect the new diagnostic algorithms and new drug regimens, as well as measures to improve the quality of patient-centered care. Sufficient anti-TB drugs for drug sensitive TB cases will be in provision. Quality-assured health care will be ensured to all TB patients at TB facility.

Ri/Dong health care providers will proactively intensify DOT activities for both drug sensitive and resistant TB and overcome the challenges to affect the adherence to treatment and treatment outcome.

2.1 Policy making, planning and disseminating- Central level workshop to update the national TB guideline incorporating internationally-recommended advanced approaches and best practice and considering the country's context will be organized and the updated guidelines will be distributed afterwards.

2.1.1 Developing the draft of updated National TB Guideline

2.1.2 Central level workshop to update the National TB Guideline

2.1.3 Printing and distribution of the updated National TB Guideline

2.1.4 International study tour of NTP members to share the experience and lessons learnt in patient management at peripheral level

2.1.5 Participation in UNION conference to adapt the advanced knowledge and practices in policy making and updating guidelines and its implementation and facilitate the resource mobilization through the contact with donors.

2.1.6 Updating the handbook of DOT for peripheral health staff and TB patients

2.1.7 Printing and distribution of handbook of DOT

2.2 Uninterrupted supply of quality-assured anti-TB drugs - It is the foremost priority to provide quality-assured anti-TB drugs continuously. But due to limited in-county resources, funds for first-line drugs are mainly provided from external supports. NTP will procure the quality-assured drugs in line with WHO technical recommendations[2] and ensure the supply of the newly developed FDCs for children. The NTP will actively get involved in making the advanced policy and planning in TB supply and strengthening the capacity of PSM (Procurement and Supply Management) system to supply the quality-assured drugs to all TB facilities. As a part of PSM strengthening, the NTP will provide support in terms of consolidating the infrastructure and regular supply for PSM system and internal QA/QC approaches focused on making the optimal conditions for fully functioning of NDRA laboratory. And the NTP will also prioritize and collaborate with PSM system to ensure the functioning of the newly introduced comprehensive tool for forecasting and quantification of TB medicines and laboratory commodities and Key Performance Indicators (KPIs) for M&E.

2.2.1 Provision of first-line drugs for adult TB and childhood TB.

2.2.2 Provision of isoniazid for IPT and LTBI

2.2.3 QA/QC of drugs at internationally-accredited laboratories

2.2.4 Central level workshop to collaborate with PSM staff to improve the capacity of PSM system to provide quality-assured commodities to TB program.

2.2.5 National workshops for updating National Drug Logistic Manual and forms in line with international recommendations

2.2.6 Printing and dissemination of updated National Drug Logistic Manual and forms

2.2.7 Provincial level workshop for city/county level PSM staff on updated National Drug Manual and forms.

2.2.8 Contract with computer agency to integrate the Quan TB tool in the existing LMIS system

2.2.9 Provision of equipment for network system to the updated logistic management software.

[2] Guidelines for the treatment of drug-susceptible tuberculosis and patient care, 2017 update; WHO/HTM/TB/2017.05

2.2.10 Central level training for provincial PSM staff on use of updated software

2.2.11 Provincial level training for county PSM staff on use of updated software

2.2.12 Maintenance of equipment of HPLC and procurement of consumables and reference substances for NDRA Laboratory

2.2.13 International TA for improving the capacity of NDRA laboratory

2.2.14 Update QA/QC manual and SOP

2.2.15 Provision of trucks for TB supply

2.2.16 Provision of fuel and maintenance for PSM vehicles to transport TB commodities

2.2.17 Renovation and procurement of materials to improve the storage condition of Provincial Medical Warehouse

Strategy 3

Rapid expansion and successful implementation of Program Management of Drug-resistance TB to the nation-wide scale

Goal of this strategy is nation-wide scale up of PMDT to provide universal access of diagnosis service to all MDR-TB suspects and to enroll all the laboratory confirmed RR/MDR TB cases on 2nd line treatment in time.

Due to limited capacity of rapid diagnostic tools and conventional DST, the current National TB Reference Laboratory does not meet the demand of diagnosis of DR-TB patients and limited resources also leads to absolute scarce of 2nd line drugs.

During the strategy period (2018-2021) NTP will strive to update PMDT guideline and expansion plan regarding the current WHO recommendation and implement them to phase out Cat II treatment and introduce short-term MDR TB regimen and new drugs in pre-XDR and XDR treatment. The NTP will take measures to meet the national demand of DR-TB diagnosis by building C&DST capacity of Tb reference laboratories and providing Gene-Xperts to county level TB facilities.

According to WHO's recently updated MDR-TB policy, treatment with the shorter MDR-TB regimen requires the exclusion of resistance to flouroquinolones in countries in which a high

resistance level against this drug category can be expected[3]. The NTP will therefor ensure that the number of sites testing for SLD resistance (via LPA) will be expanded to ensure that all patients with rifampicin resistance detected by Xpert are tested for SLD resistance before the start of treatment (see Strategy 1).

Delivering DR-TB care to patients, the NTP will keep the rule of integrated and patient-centered care. Continuously expanding the number of cases enrolled on 2nd line treatment every year, NTP will enroll more than 90% of the estimated MDR-TB cases by 2021. The current MDR-TB estimates will be revised based on the outcome of the planned DRS, the interim results of which are expected to be available by 2018. For patient treatment model, NTP will shift from current six monthly cohort model to continuous enrolment model while minimizing the delay from diagnosis to treatment of DR-TB.

The NTP has conducted operational research on effectiveness of three different treatment models (hospitalization care in full course treatment, ambulatory care in full course treatment and combined model with hospitalization in intensive phase and ambulatory care in continuation phase) in Pyongang city, North Pyongan province and South Pyongan province for 1 year since 2016. The operational research aimed to provide answers to questions like “Which treatment model is more effective with regard to patient’s friendliness, treatment outcome, management of side effects, feasibility of approach and cost effectiveness?”

Recognizing that the combined model of hospitalization and ambulatory treatment is better than any other treatment model in terms of patients/patient’s family friendliness, management of side-effects and treatment outcome, the NTP decides to discharge the DR-TB cases after culture conversion and provide ambulatory DR-TB service in continuation period.

Therefore in the second half of 2017, the NPT initiates the ambulatory care for MDR-TB discharged from PTHs and referred to respective cTPI. If the number of enrolled MDR-TB patients goes beyond the patient-holding capacity of PTH due to drastic increase of enrollment, MDR-TB treatment will be decentralized and hospitalized patient care will be given in MDR-TB wards of respective cTPIs for intensive treatment. In parallel with nation-wide scale-up and decentralized care of PMDT, cTPI capacity for PMDT needs to be

[3] WHO treatment guidelines for drug-resistant tuberculosis, 2016 update. October 2016 revision. WHO/HTM/TB/2016.04

developed in a short time. The NTP will endeavor to establish the national R&R system covering peripheral level in evolving situation of current PMDT.

Prioritizing and paying special attention to management of side-effects, the NTP will procure the equipment for aDSM like blood & biochemistry analyzer, automatic ECG machine, vision testing sets (Ophthalmoscope, Snellen Eye Chart and Ishihara Test Book), audiometer and distribute them to PTHs and PTPIs. The NTP will take appropriate measures to establish aDSM for management of adverse drug reactions (ADRs) in close collaboration with relevant authorities and stakeholders.

Expected result

By implementing planned interventions during 2018-2021, national needs of DR-TB diagnosis will be met and all diagnosed DR-TB cases will start treatment.

Comprehensive patient-centered ambulatory treatment service will be delivered and capacity of PMDT at provincial and country level will be improved a lot. PMDT will be conducted mainly based on short-term regimen and aDSM will be established in parallel with introduction of short-term regimen.

3.1 Policy making and HRD - NTP will organize the central level workshop to update PMDT guideline, print and distribute updated the guideline to all TB facilities. NTP will maintain the close collaboration with WHO and other international technical agency such as International Union Against Tuberculosis and Lung Disease, other country's NTPs to share the experience and lessons learnt and identify the way forward for better performance of PMDT.

Trainings and refresher trainings of health workers on PMDT will be organized from central level to county level. The NTP will prioritize the capacity building for cTPI, since roles and responsibilities of county level staff is essential for providing ambulatory medical service to the culture-converted MDR-TB cases.

3.1.1 Developing the draft of updated PMDT guideline

3.1.2 Central level workshop to update PMDT guideline

3.1.3 Printing and distribution of updated PMDT guideline

3.1.4 Central level training of provincial TB doctors on PMDT

3.1.5 Provincial level training of country TB doctors on PMDT

3.1.6 External TA for improving PMDT

3.1.7 International Training/study tour of PMDT

3.1.8 Technical support from Green Light Committee

3.2 Management of MDR-TB cases during 2nd line treatment - It is critical important to improve the management of DR-TB patients as the scope of PMDT expansion becomes nation-wide. The NTP will procure the sufficient equipment and consumables for pre-evaluation and management of ADRs of MDR-TB patients for all PTPIs and PTHs.

3.2.1 Provision of blood & biochemistry analyzers for PTPIs and PTHs.

3.2.2 Provision of voltage & frequency stabilizers for blood & biochemistry analyzers

3.2.3 Provision of reagents & consumables for blood & biochemistry analyzers

3.2.4 Provision of refrigerators for storage of blood & biochemistry reagents

3.2.5 Maintenance of blood & biochemistry analyzers

3.2.6 Provision of equipment for monitoring ADRs (ECGs, audiometers, vision testing sets, opthalmoscope, etc.)

3.2.7 Maintenance of equipment for monitoring ADRs

3.2.8 Central level training of laboratory staff from PTPIs and PTHs on use of blood & biochemistry analyzers

3.2.9 Central level training of staff from PTPIs and PTHs on use of equipment monitoring ADRs

3.3 Treatment of MDR-TB cases – The NTP will procure quality-assured 2nd line drugs to treat confirmed DR-TB cases including children in time. The priority will be given to ensure the in-country stock of 2nd-line drugs for timely and continuous enrollment of confirmed DR-TB cases.

Based on the Operational Research result, all the confirmed MDR-TB cases will be hospitalized until culture conversion and provided the ambulatory care at the respective Ri/Dong clinics after conversion.

The NTP will adopt the WHO 2017 recommendation to phase out Cat II treatment and introduce individualized treatment according to the DST results. Since the second half of 2017 as a pilot Cat II treatment will be phased out and the pilot will be completed by 2018. Based on experience and lessons learnt from this pilot the NTP will expand this approach to all parts of the country in phased manner, therefore Cat II regimen will be eventually phased out by 2020 in the country.

Short MDR-TB regimen will be introduced as a pilot since 2018 and cover the whole country in 2020, based on the results and experiences from the pilot, together with establishment of aDSM. Equipment and consumables for TB infection control such as UV lamp, N95 masks, gloves, gowns and surgical masks will be procured and distributed to all PMDT sites.

3.3.1 Central level workshop for development of aDSM forms.

3.3.2 Central level training of provincial staff on aDSM.

3.3.3 Provincial level training of county staff on aDSM

3.3.4 Provision of 2nd-line drugs (H mono-poly resistant regimen, short-term regimen, long-term regimen and XDR regimen)

3.3.5 Provision of ancillary drugs for management of ADRs

3.3.6 Provision of IC consumables and equipment (N95 mask, surgical mask, gown, UV lamps, etc.)

Strategy 4

Improve the quality of Monitoring and Evaluation approaches and strengthen TB surveillance system

The NTP has established and strengthened the M&E system across the country since the DOTS introduced in the country. The great achievements were made in the M&E activities, however there still remain challenges to be overcome.

The capacity of the data collection, compiling and analysis should be improved and particularly the first task for the NTP to establish TB electronic data management system.

The NTP plans to cease the paper-based data management system and establish the real-time case-based, intranet supported, electronic recording and reporting system and user-friendly database that enables central and provincial M&E staff compile the case-based TB data in timely and accurate manner.

M&E system should be updated and strengthened as new interventions and innovative tools will be introduced in the practice of TB prevention including LTBI treatment, diagnosis, ACF and treatment. Moreover in the strategy period, the PMDT will be expanded to county level over the country and the active case finding will be strengthened, therefore it is regarded as the pressing issue to initiate and intensify the integrated M&E activities on these areas.

The NTP will revise the R&R forms and formats incorporating the internationally-used M&E indicators in line with WHO's latest recommendations[4], and update the checklists of supervisory visit and EQA accordingly.

Following the establishment of TB surveillance system based on the electric recording and reporting system, the NTP take actions to improve the quality of data analysis and strengthen the human resource.

To ensure the successes in M&E the supervisory visits, review meetings, workshops for M&E staffs will be regularized.

The NTP will intensify the logistic support for regular central-province level and province-county level supervisory visit.

Expected result

The regular M&E activities for all components of TB and MDR-TB program management will be conducted and the implementation of the program will be further improved.

The strength and weakness in the MDR-TB management and ACF, case management in the key risk group and laboratory service will be identified and subsequently the way forward to

[4] World Health Organization 2013. Definitions and reporting framework for tuberculosis – 2013 revision. WHO/HTM/TB/2013.2

overcome bottlenecks will be sought.

And the concrete and comprehensive data will be collected for the evidence-based policy making and planning.

4.1 establishing the national TB surveillance system based on the e-data management - Currently the NTP has used the paper-based R&R system.

Through the GF support (2015-2018) the central workshop for establishing the e-data management system of TB was conducted and the NTP is about to contract with software specialized agency to develop the software.

Once the software is available for the program, the training material for utilization of software will be developed and the training for the central and provincial staffs will be conducted under the current GF grant.

Since 2018, the e-data management will be initiated through the intranet already established across the country.

As a first stage, the e-data transmission will be done between central and provincial level and it will be expanded to the county level following completion of logistic and technical support to cTPIs.

4.1.1 Provision of the server computer at the central level for the e-data management

4.1.2 Provision of the solar battery system for computers at PTPI

4.1.3 Provision the IT equipment including computer, modem, printer and power stabilizer for cTPIs

4.1.4 Provision the solar battery system for computers at cTPI

4.1.5 Training and refresher training on the e-data management for the county level staffs

4.2 Strengthening the M&E - The NTP will give the priority on the improving the human resource for strengthening the M&E.

The training will be organized for the M&E staffs to fully understand the newly introduced activities and conduct the fruitful supervision to the lower units.

And the R&R forms and formats will be revised considering WHO-recommended M&E indicators and the checklists for supervisory visits will be updated to properly supervise all activities done by lower level.

The regular supervisory visits have faced the challenges due to lack of functional vehicles at TB facilities. Therefore the NTP will procure the new vehicles for the supervisory visit and supply the fuel and spare parts for running vehicle.

According to the M&E plan, central-provincial level and provincial-county level supervisory visit will be conducted regularly every quarter and the biannual review meeting will be conducted at central and provincial level to review the strength and weakness in the implementation of TB program and discuss the way forward.

4.2.1 Central workshop for revising R&R forms and formats and checklists of supervisory visit

4.2.2 Printing and distribution of revised R&R forms and formats and checklists

4.2.3 Central level training for central M&E staff

4.2.4 Central level training for provincial M&E staff

4.2.5 Provincial level training for county level staff on the M&E

4.2.6 Biannual review meeting at central level

4.2.7 Biannual review meeting at provincial level

4.2.8 Central - provincial supervisory visit (twice a year to every province)

4.2.9 Provincial - county supervisory visit (twice a year to every county)

4.2.10 Workshop for strengthening M&E

4.2.11 International training for TB epidemiologists

4.2.12 Study tour for review the operationalization of updated e-data management

4.2.13 Procurement of the vehicles for the supervisory visit at CTPI and PTPI

4.2.14 Supply the fuel and maintenance for vehicles

4.2.15 Provision the motorcycle for the supervisory visit of cTPI

Strategy 5

Foster multi-sectoral approaches with other government authorities, civil society, NGOs, other health programs including nutrition program and health facilities out of NTP to improve the prevention, diagnosis and treatment of TB

Given the strengthened partnership with all other health programs, other health facilities outside control of the NTP, communities, civil society, NGOs beyond the scope of the NTP, the goal for end TB will be able to be achieved.

The national TB program has proactively conducted campaigns for promoting the partnership with relevant authorities, civil society and community-based groups working at the peripheral level since 2010. Consequently staff from youth league, women's association, trade unions, Union of agricultural working people, Korean Federation of Red Cross (KFRC) and Korean Federation of Protection of Disabled (KFPD) have got involved in disseminating the knowledge of TB to community and supporting the referral of TB suspects to health facility to receive the quality-assured diagnosis and treatment service.

In addition the MoPH organized the orientation meeting with health care providers in charge of key affected population such as workers in mining areas and health staff from the army and police outside control of MoPH to ensure the uniformity of TB management over the country in line with the National TB Guideline.

In the strategy period (2018-2021), The NTP will take actions to encourage the active participation of community in TB control activities and make the environment for all health facilities in the country to implement the TB management in line with the updated TB guideline.

First of all, under the close collaboration of other health programs (MCH, IMCI, children's nutrition program, NCD program, tobacco control program, health facilities in the industrial area), the NTP will strive to detect more cases among risk groups and improve TB case management.

In addition, the NTP will establish collaborative activities with the National Program for HIV-Testing, with the aim of providing HIV-testing to all diagnosed TB patients, in order to

clarify the role of HIV in the development of the TB epidemic.

Furthermore the NTP will conduct workshops and orientation meetings with health staff out of administrative control of the NTP so that they will actively find TB suspects within their entities and refer the suspects to the respective cTPIs in the residual area, and manage TB cases in line with the National TB Guideline once the TB cases are confirmed. And also, trainings will be organized for TB staff of army and police to expose them to the advanced knowledge and international best practices in TB management.

The NTP will focus on generating the awareness of the people that tuberculosis can be curable and empowering the communities to actively take part in the diagnosis and treatment of TB by decreasing stigma with comprehensive knowledge about TB

The community-based groups like Korean Federation of Red Cross (KFRC) and Korean Federation of Protection of Disabled (KFPD) which deliver the medical service to peripheral level and civil society bodies like youth league, women's' association, trade unions, Union of agricultural working people which have their nation-wide network will actively participate in the TB control activities.

These organizations will spread TB information among communities through IEC activities and support health facilities to successfully deliver the patient-centered services to hard-to-reach communities.

NTP will organize the regular meeting with the concerned high-level policy makers from other government authorities to involve them in the TB control activities.

With the help of the international organizations like the Global Fund, UNICEF and WHO, the NTP will organize activities to identify donors or partners among INGOs and charitable organizations who can multilaterally or bilaterally co-operate and assist on the issue of the nutritional challenges of TB patients.

NTP will also have the conference with other relevant local parts involved in solving the nutritional problems of TB cases including the cabinet, MoPH, Korean Red Cross Society, Ministry of Procurement and Food Administration, and TV Broadcasting Station and Central Broadcasting Committee of DPRK.

It will include the medical colleges from all the medical university for inclusion of all aspects of TB programme management in the academic curricula.

Having recognized that it is very important for building human capacity for TB sectors and other health sectors as well to include the updated part of TB program in academic curricula, The NTP will conduct the workshop with teachers and staffs form all the medical universities and nurse schools to reflect the advanced knowledge in curriculum of medical schools.

Expected outcome

Involvement of all sector, civil society and NGOs will empower communities with better knowledge of TB prevention, care and control. Clarification of the role of HIV in the epidemiology of TB in DPRK.

Improved awareness of communities on TB will help in early detection of TB among symptomatic leading to proper treatment and breaking the chain of transmission, especially case detection and treatment among key risk groups.

All sectors will provide services or will be able to guide symptomatic to the right place to avail services for TB control by only one standard.

5.1 strengthening coordination with other health programs - The NTP will coordinate the collaboration with the MCH/IMCI program, children's nutritional program, the National Program for HIV testing, the NCD program, Tobacco control program and health facilities of industrial area for improving TB diagnosis and treatment in key risk groups, and addressing the risk of co-morbidity with TB in specific risk groups such as diabetics.

The NTP will ensure the cooperation with the MCH program and nutrition program to improve pediatric TB diagnosis and treatment, since the comparatively low pediatric TB notification rate has been recorded and children are identified as one of the vulnerable groups by the NTP. Specific attention will be given to the risk of TB associated with soil-transmitted helminths (STH), which have a considerable prevalence among children in DPRK and are associated with immunodeficiencies, thus increasing the risk of TB.

Therefore it will regularly organize workshop and sensitization meeting with staff from TB program, MCH/IMCI program and children's nutrition program at all levels for the further strengthening of finding pediatric TB suspects, referral system, diagnosis and management of pediatric TB cases.

The NTP will establish collaborative activities with the National Program for HIV-Testing, with the aim of providing HIV-testing to all diagnosed TB patients, in order to clarify the role of HIV in the development of the TB epidemic.

NTP will conduct activities for collaboration with NCD program to increase the notification rate in the risk groups, considering some NCD patients (for example, diabetes) are predisposed to development of TB and TB incidence is higher among smoking people as the results of National TB Prevalence Survey indicated.

The workshop with staff from both of TB program and NCD program will be undertaken at the central level, and points deliberated and results of the workshop will be disseminated to the health workers at province, county and Ri/Dong level

It is considered as a crucial activity for providing quality-assured diagnosis and treatment to key affected population to coordinate with health facilities providing medical service to the peoples working in the industrial areas under the Ministry of Coal Industry, the Ministry of Mining Industry, the Ministry of Construction and Building Material Industry, the Ministry of electricity, the Ministry of Metal Industry.

The NTP has supported Sipho Silicosis Hospital through GF grant as a part of the collaboration approaches from 2015.

In the strategy period, the NTP will further strengthen logistic and technical support to the hospitals and clinics in workplace of the industrial areas and also pay attention on the capacity building of the health staff of industrial areas and will enhance the collaboration with those sectors for the effective TB care.

5.1.1 Workshop with central and provincial staff from TB program, MCH/IMCI program and children's nutrition program for improving pediatric TB management

5.1.2 Workshop with central and provincial staff from the National Program for HIV testing to establish procedures to ensure the HIV testing of all diagnosed TB patients

5.1.3 Workshop with central and provincial staff from TB program and NCD program for improving TB management in key risk groups

5.1.4 Cascade workshop to inform provincial staff of the issues deliberated and results of Central level workshop (participants: staff from provincial TB program, MCH/IMCI program and children's nutrition program)

5.1.5 Cascade workshop to inform county level staff of the issues deliberated and results of Central level workshop (participants: staff from county level TB program, MCH/IMCI program and children's nutrition program)

5.1.6 Cascade workshop to inform Ri/Dong clinic doctors of the issues deliberated and results of Central level workshop

5.1.7 Supply of mobile diagnostic van equipped with digital X-ray and Gene-Xpert to Sinpho Silicosis Hospital for active case detection

5.1.8 Supply of fuel and maintenance for mobile diagnostic van of Sinpho Silicosis Hospital

5.1.9 Supply of portable digital X-ray machines to health facilities in industrial areas

5.1.10 Maintenance of portable digital X-ray machines

5.1.11 Provincial level training for staff responsible for TB in industrial areas.

5.1.12 Development of training materials for pediatric master trainers on pediatric TB management

5.1.13 Central level training and refresher training for pediatric master trainers on peidatric TB management

5.2 Strengthening collaboration with health facilities outside the NTP control - Orientation meetings and sensitization workshops will be organized to ensure TB case management in line with the updated National TB Guideline even in the health facilities outside control of the NTP such as army and police.

TB patients from these sectors are confirmed and registered in the respective cTPI in their living areas. Therefore the NTP will conduct trainings for health staff on several activities such as suspect finding and referral, TB & MDR-TB case management, TB infection control and active case finding so that they follow the guidelines in their medical practice.

5.2.1 Central level orientation meeting with health staff from army and police

5.2.2 Provincial level orientation meeting with health staff from army and police

5.2.3 Training for central level health staff from army and police

5.2.4 Training for provincial level health staff from army and police

5.3 Engage civil society and communities to fight against TB and strengthening multi-sectoral approaches with relevant sectors – Through the partnership with Korean Federation of Protection of Disabled and Korean Federation of Red Cross which has a responsibility of care givers, the NTP will provide the environment to increase the access of quality DOTS service for people with TB symptoms. Therefore the sensitization workshop for staff from two organizations will be held at all levels.

And the NTP plans to engage the community-based groups such as youth league, women's union, trade union, Union of agricultural working people in TB control activities to improve the awareness of communities on TB and promote the case finding, case management and social support to TB patients. The orientation meeting with staff from social organizations will be held at all levels.

Information dissemination activities will be conducted to distribute the correct information on the TB and reduced the stigma among TB patients through the TV and radio channels. And handbooks, leaflets and posters on TB for TB patients and general population will be developed, published and disseminated by the NTP.

“World TB day” events with participation of all the relevant organizations and bodies will be held to advocate for support for TB control at central and provincial level.

“World TB day” events will be held to advocate for TB elimination at central and provincial level.

5.3.1 Sensitization workshop with the staff of KFRC, KFPD at central level

5.3.2 Sensitization workshop with the staff of KFRC, KFPD at provincial level

5.3.3 Sensitization workshop with the staff of KFRC, KFPD at county level

5.3.4 National level orientation meetings with central level units of youth league, women's union, trade unions, Union of agricultural working people

5.3.5 Provincial level orientation meetings with central level units of youth league, women's union, trade unions, Union of agricultural working people

5.3.6 County level orientation meetings with central level units of youth league, women's union, trade unions, Union of agricultural working people

5.3.7 Commemorative activities for “World TB Day” at central and provincial level

5.3.8 Developing and printing of communication material on TB (handbook, leaflets, bench note and posters)

5.3.9 Distribution of TB educative materials through TV and radio spots

5.3.10 National level workshop for the improvement of TB patients` nutrition (Cabinet, MoPH, Korean Red Cross Society, Ministry of Procurement and Food Administration, etc.)

5.3.11 Regular workshops with partners and high level policy makers from other government authorities related to TB control

5.3.12 Nutrition supply for TB & DR-TB patients

5.3.13 Warm clothing supply for TB & DR-TB patients

Strategy 6

Contribute to Strengthening Health System focused on improving the quality of patient care through Primary Health Care approach

The focus of this strategy is on the components that contribute to building the overall health system capacity to improve the quality of patient care at county and Ri level service delivery. It is critical in the strategy period to conduct trainings and refresher trainings for health staff on newly introduced modalities, newly planned interventions/activities and advanced knowledge and practice in TB control program.

And infrastructure improvement and supply of key tools for patient care at PHC level will receive the enhanced attention.

The strategy is aimed at improving capacity of the primary health care system by implementing intervention for strengthening health workforce, providing equipment and improving the infrastructure.

Expected results

The strategy will enhance capacity of health care providers in TB area at all levels through various trainings and refresher trainings. The service delivery at Ri/Dong level will be improved through the trainings and refresher trainings for household doctors and TB doctors of Ri/Dong clinic which will contribute to increasing the benefit of House Hold Doctor's system laying the cornerstone of PHC service within the country. The various training including for the HHD will contribute improved service delivery. Essential inputs will be provided to improve general health infrastructure for better efficiency of patient care and working environment for health care providers.

6.1 Strengthening health workforce – The NTP will initiate steps to revise and update guidelines based on introduction of planned newer interventions considering the international standards and country's specific conditions. Technical and management capability of health personnel at various levels within the NTP will be built through regular training including induction and refresher training that will assist to improve general service delivery, supervision, monitoring and evaluation. In the strategy period TB Infection control guideline will be developed and distributed to all health facilities in the country to intensify TB Infection Control measures at all levels to mitigate the risk of TB transmission.

6.1.1 Training/refresher training for central level staff on prioritized component of TB program management (childhood TB, laboratory, PMDT, ACF, TBIC, updated approaches in M&E, etc.)

6.1.2 Training/refresher training for provincial level staff on prioritized component of TB program management (childhood TB, laboratory, PMDT, ACF, TBIC, updated approaches in M&E, etc.)

6.1.3 Training/refresher training for county level staff on prioritized component of TB program management (childhood TB, laboratory, PMDT, ACF, TBIC, updated approaches in M&E, etc.)

6.1.4 Training/refresher training for Ri level household doctors and TB doctors on updated and revised component of TB program management

6.1.5 Training for Ri level TB doctors on MDR-TB case management

6.1.6 Developing the draft of TB Infection Control guideline

6.1.7 Workshop for finalizing the TB Infection Control guideline

6.1.8 Printing and distribution of the TB Infection Control guideline

6.2 Infrastructure and equipment – The activities planned under this intervention are aimed at improving patient care at health facilities. A priority will be given to the support for county TB preventive institutes and Ri/Dong clinics to improve the quality of TB care at the peripheral level. Infrastructure of PTPIs and PTHs will be improved to provide quality TB-specialized care including the surgical service. Limitations of transportation to support the overall program management and transportation of patients will be improved.

6.2.1 Rehabilitation of in-patient ward of county TB preventive institute

6.2.2 Provision of doctor's kit for health staff of central/provincial/county TB facilities

6.2.3 Provision of tricycle for county TB preventive institute to transport TB patients and drugs

6.2.4 Provision of fuel and maintenance for tricycle

6.2.5 Provision of doctor's kit for TB doctors at Ri level

6.2.6 Provision of bicycle for TB doctors at Ri level for supervising DOT and frequent travel from county to Ri and from clinic to patients' household

6.2.7 Renovation of 5 PTHs (Pyongyang PTH, Ryanggang PTH, Jagang PTH, Kangwon PTH and South Hwanghae PTH).

6.2.8 Rehabilitation of operating theatre of PTPIs and PTHs and procurement of equipment for surgery

6.2.9 Provision of ambulance for PTHs for transportation of TB cases

6.2.10 Provision of fuel and maintenance for ambulances

6.2.11 Rehabilitation of Central TB Surgery Center and procurement of equipment for surgery

6.2.12 Provision of fuel and maintenance for program vehicles at central and provincial level

Strategy 7

Promote TB research including clinical, operational and development research project for effective control of TB

The National TB Program has a TB research centre in the CTPI aimed at implementation of TB research projects including operational research and clinical research. Having a close relationship with the health facilities of the NTP, TB experts in the Pyongyang college of Medicine under the Kim Il Sung University and other research institutes such as research institutes of the State Academy, Korean Academy of Medical Science and National Committee of Science and Technology, the TB research centre has been doing research to find a proper way to fight against TB applicable to the country context to improve current TB activities. Recognizing that TB research has a critical role in the policy making, planning and implementation of TB control activity, the NTP has a plan to offer the desirable working conditions for the research and to raise the research work to a higher level.

The priority of research work will be given to find appropriate way to increase the effectiveness of TB treatment and maximize the cost-effectiveness of TB control activity. Efforts will also be made to study the role of traditional Koryo medicine in terms of improving health conditions of TB cases and better treatment outcomes.

Implementing the plan for research agenda will need support in development of adequate human resources (HRD) and strengthening infrastructure for TB research which will enable implementation of the research.

Expected results

The capacity of the TB research centre will be significantly strengthened to deal with the theoretical and practical issues arising in the struggle against TB, and the powerful research work system will be established to ensure scientific and technical support for the

implementation of NTP in strong coordination with relevant organizations and institutions.

The methodology for managing TB and MDR-TB which fits into the country's situation will be identified and introduced into practice. The NTP will aim at publishing research findings in peer- reviewed scientific journals/references and will disseminate the findings across the NTP including the peripheral levels.

7.1 Human Resources Development – Fostering the partnership networks with other research bodies in the country, TB research centre will regularly organize workshops to discuss ways to solve the issues arising in the TB research work and share the updates of research projects. The TB research centre will intensify communications with globally acknowledged TB partners and research agencies so as to exchange the experience and information and introduce the advanced technology into TB activities.

7.1.1 In-country training of TB researchers and TWG members

7.1.2 Participation in international workshops and conferences for exchange of information on advances in TB control

7.1.3 Workshop for NTP policy makers, researchers, NTP central and provincial staff and other relevant sectors on TB research issues (in which a prioritized research agenda will be also developed)

7.1.4 Translation and printing of international TB reference publications

7.2 Strengthening infrastructure for TB research – It is planned to support the TB research center with vehicles and office equipment to help in managing with research work as well as support for infrastructure renovations.

7.2.1 Renovating physical structure of National TB Research Centre

7.2.2 Provision of office and communication equipment

7.2.3 Provision of equipment, for TB pathology study

7.2.4 Provision of reagents and consumables for TB pathological study

7.2.5 Provision of equipment for TB pharmacology study

7.2.6 Provision of reagents and consumables for TB pharmacological study

7.2.7 Provision of equipment for wards of patients to be involved into clinical study

7.2.8 Provision of consumables for TB clinical study

7.2.9 Provision of vehicle for TB research center

7.2.10 Provision of fuel and maintenance for the vehicle of TB research center

7.3 Conduct research – Nation-wide Drug Resistance Surveys will be undertaken to obtain the representative data of DR-TB and analyze and TB Mortality Survey is planned to get the scientific baseline of mortality being one of the important impact indicator for the program.

The NTP will introduce the short regimen for MDR-TB and undertake the management of XDR-TB in the strategy period, therefore the TB research center will implement the research project related to the newly-introduced regimens, which aims to evaluate the effectiveness of the regimen, understand the general profile of side effects during the treatment and seek for the proper measures to alleviate the ARS in the country context.

The NTP will endeavor in some TB research projects to apply the traditional medicine for further improvement of standardized TB treatment outcomes. The following research areas are considered which will be modified as per the program needs.

7.3.1 Nation-wide Drug Resistance Survey

7.3.2 TB mortality survey

7.3.3 Research on the effectiveness and side effects of short regimen for MDR-TB

7.3.4 Research on the effectiveness and side effects of XDR-TB treatment regimen

7.3.5 Research to improve the effectiveness of ACF

7.3.6 Other research project

Monitoring and Evaluation

The NTP has a comprehensive and revised M&E work plan for the NSP 2018 – 2021. The M&E plan will defines the impact, outcome, output and process indicators for the strategy and activities as defined in the NSP.

Table 10: Impact indicators for M&E

Impact indicators		Baseline			Targets						Remarks
		Value	year	Source	2016	2017	2018	2019	2020	2021	
1	TB incidence rate (per 100,000 pop)	561	2015	Global TB report	520	495	465	430	395	360	The baseline will be modified according to the final results of NPS
2	TB mortality rate (per 100,000 pop)	33	2015	Vital registration data	29	22	17	14	12	11	Based on the vital registration, the baseline is set.
3	TB prevalence rate (per 100,000 pop)	640	2015	NPS	610	520	450	390	350	320	The baseline will be modified according to the final results of NPS
4	Percentage of MDR TB cases out of newly notified TB cases (%)	1.93	2014	DRS	1.93	1.93	1.93	1.93	1.93	1.93	The baseline is set according to the results of small scale of DRS in 2014

Table 11: Outcome indicators for M&E

Outcome indicators		Baseline			Targets					remarks
		Value	Year	Source	2017	2018	2019	2020	2021	
1	Case notification rate of all forms of TB per 100,000 population	464	2016	R&R system	470	442	409	375	342	
2	Case notification rate of bacteriologically-confirmed cases per 100,000 population (New + Relapse)	189	2016	R&R system	192	180	167	153	140	
3	Treatment success rate - all forms of TB	90.18	2016	R&R system	90	90	90	90	90	The baseline and target will be rectified following the results of review on TSR in the early of 2018.
4	Treatment success rate - bacteriologically confirmed TB cases	88.37	2016	R&R system	88	88	88	88	88	The baseline and target will be rectified following the results of review on TSR in the early of 2018.
5	Treatment success rate of MDR-TB: Percentage of bacteriologically confirmed drug resistant TB cases (RR-TB and/or MDR-TB) successfully treated	79	2016	R&R system	75	75	75	75	75	
6	Percentage of new pediatric TB cases notified out of all new TB	5.92	2016	R&R system	6.3	6.6	6.8	6.9	7	

	cases (%)									

Table 12: Output indicators for M&E

Output indicators		Baseline			Targets					Remarks
		value	Year	Source	2017	2018	2019	2020	2021	
1	Number of notified cases of bacteriologically confirmed TB, (New and relapse)	46060	2016	R&R system	46945	44405	41328	38112	34960	
2	Number of notified cases of all forms of TB (New and relapse)	112606	2016	R&R system	115003	108779	101242	93364	85642	
3	Number of new pediatric TB cases notified	6085	2016	R&R system	6513	6823	7030	7133	7237	
4	Percentage of laboratories showing adequate performance in external quality assurance for smear microscopy among the total number of laboratories that undertake smear microscopy (%)	93.17	2016	R&R system	90	90	90	90	90	
5	Percentage of reporting units reporting no stock-out of first-line anti-TB drugs (%)	100	2016	R&R system	100	100	100	100	100	
6	Percentage of HMIS or other routine reporting	100	2016	R&R system	100	100	100	100	100	

	units submitting timely reports (%)									
7	Number of drug resistant TB (RR-TB and/or MDR-TB) started on treatment for MDR-TB	814	2016	R&R system	2000	2500	3000	5000	7000	

Financial Plan

Through a consultative process a detailed financial and operation plan for implementing the National Strategic Plan 2018 – 2021 for Tuberculosis Control has been developed. Activities under the strategy have been costed based on existing norms of expenditure and learnings from prior implementation period. The resource allocation follows the components, activities and indicators indicated by the seven Strategic Directions. And total financial need of NTP during the strategy period, the government contribution and the financial gap are described as per the cost category.

Table 13: Budget plan as per strategy (USD)

Strategy	2018	2019	2020	2021	TOTAL
Strategy 1	11,152,771	9,092,372	7,822,900	3,761,801	31,829,844
Strategy 2	11,434,220	10,597,413	9,730,904	9,045,409	40,807,946
Strategy 3	7,039,171	4,940,834	7,477,576	10,361,556	29,819,137
Strategy 4	1,465,560	971,592	428,050	230,992	3,096,194
Strategy 5	44,408,486	43,172,648	41,565,472	38,345,337	167,491,943

Strategy 6	7,206,116	12,326,139	12,055,639	12,021,539	43,609,433
Strategy 7	1,132,729	301,273	301,273	281,273	2,016,548
TOTAL	83,839,053	81,402,271	79,381,814	74,047,907	318,671,045

Table 14: Government contribution as per strategy (USD)

Strategy	2018	2019	2020	2021	TOTAL
Strategy 1	767,100	786,300	806,000	763,400	3,122,800
Strategy 2	297,400	293,000	296,000	295,100	1,181,500
Strategy 3	469,200	499,400	531,200	654,200	2,154,000
Strategy 4	203,080	208,160	213,245	215,000	839,485
Strategy 5	141,200	144,700	148,100	150,300	584,300
Strategy 6	3,672,220	3,763,440	3,842,755	3,856,300	15,134,715
Strategy 7	171,700	170,100	171,900	167,800	681,500

TOTAL	5,721,900	5,865,100	6,009,200	6,102,100	23,698,300

Table 15: Financial gap as per strategy (USD)

Strategy	2018	2019	2020	2021	TOTAL
Strategy 1	10,385,671	8,306,072	7,016,900	2,998,401	28,707,044
Strategy 2	11,136,820	10,304,413	9,434,904	8,750,309	39,626,446
Strategy 3	6,569,971	4,441,434	6,946,376	9,707,356	27,665,137
Strategy 4	1,262,480	763,432	214,805	15,992	2,256,709
Strategy 5	44,267,286	43,027,948	41,417,372	38,195,037	166,907,643
Strategy 6	3,533,896	8,562,699	8,212,884	8,165,239	28,474,718
Strategy 7	961,029	131,173	129,373	113,473	1,335,048
TOTAL	78,117,153	75,537,171	73,372,614	67,945,807	294,972,745

Technical Assistance Plan

Technical assistance plan for activities under each strategic intervention are described as below.

Table 16 Technical Assistance Plan

Activity	Expert profile	Year	Responsible partner	budget (US$)	Funding source
Strengthening TB laboratory network	TB laboratory/ microbiologist	Annually	WHO	45 000 per year	TBD
TB operational research	Public Health and OR	2018	WHO, NTP	15 000	TBD
GLC TA	GLC	Annually	WHO	25 000 per year	TBD
TA for introduction of short regimen for MDR-TB and revision of PMDT guideline	MDR-TB expert	2018	WHO, NTP	20 000	TBD
Installation and maintenance of equipment	Manufacturer of health equipment	2019, 2020	UNICEF, NTP	22 000	TBD
WHO regular TA through WCO	WHO staff	Annually	WHO	250 000 per	TBD

				year	