WORKSHOP REPORT

OPERATIONAL/ IMPLEMENTATION RESEARCH PRIORITIES

NATIONAL TUBERCULOSIS PROGRAMME

MYANMAR
2017

26th and 27th July, 2017
Nay Pyi Taw

Workshop on Development of National Operational/ Implementation Research priorities
Workshop dates: 26th and 27th July 2017
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The research agenda development was developed under the leadership of Dr. Si Thu Aung (Programme Manager, National TB Programme) and Dr. Saw Saw (Director [Planning], Department of Medical Research).

The following core working group members provided technical guidance to this research agenda development process: Dr. Si Thu Aung (Programme Manager, NTP), Dr. Myo Su Kyi (Deputy Regional Public Health Director, Nay Pyi Taw Council), Dr. Wint Wint Nyunt (Senior Microbiologist, NTRL), Dr. Wah Wah Aung (Director [Advanced Molecular Research Centre], DMR), Dr. Saw Saw (Director [Planning], DMR), Dr. Kyaw Thu Soe (Research Officer, DMR), Dr. Ikushi Onozaki (Medical Officer, WHO), Dr. Khin Su Su Hlaing (M&E Advisor, Challenge TB Project, FHI 360), Dr. Ajay MV Kumar (Director [Research], Center for Operational Research, The Union), Dr. Srinath Satyanarayana (Deputy Director [Research], Center for Operational Research, The Union), Dr. Nang Thu Thu Kyaw (Senior Operational Research Fellow, The Union, Myanmar), Dr. Khine Wut Yee Kyaw (Operational Research Fellow, The Union, Myanmar), Dr. Myo Minn Oo (Operational Research Fellow, The Union, Myanmar).

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Abbreviations

ACF	Active case finding/ Accelerated case finding
ART	Anti-retroviral Therapy
BCG	Bacillus Calmette–Guérin
BHS	Basic Health Staff
CBO	Community Based Organisation
CBTBC	Community Based TB Care
CI	Confidence intervals
COE	Centre of Excellence
CXR	Chest X-Ray (radiography)
DHIS	District Health Information Software
DM	Diabetes Mellitus
DMR	Department of Medical Research
DR-TB	Drug Resistant Tuberculosis
EPHS	Essential Package Health Services
EQA	External Quality Assurance
FHI 360	Family Health International 360
GF	Global Fund
GXP	Xpert MTB/RIF
HCP	Health Care Provider
HIV	Human Immunodeficiency Virus
INGO	International Non-Governmental Organisation
ICMV	Integrated Community Malaria Volunteer
IPs	Implementing partners
IPT	Isoniazid Preventive Therapy
IR	Implementation Research
MC	Microscopy Centres
MDR-TB	Multidrug Resistant Tuberculosis
MHAA	Myanmar Health Assistant Association
MMT	Methadone Maintenance Therapy
MOHS	Ministry of Health and Sports
MSF	Medecins Sans Frontieres
NAP	National AIDS Programme
NGO	Non-Governmental Organisation
NHP	National Health Policy
NSP	National Strategic Plan
NTP	National Tuberculosis Programme
NTRL	National Tuberculosis Reference Laboratory
OR	Operational Research
PLHIV	People Living With HIV
PPM	Public Private Mix
PSI	Population Services International
PTB	Pulmonary Tuberculosis
PZA	Pyrazinamide
RR-TB	Rifampicin Resistant Tuberculosis

SCC	Sputum Collection Centre
SHG	Self Help Group
SOP	Standard Operating Procedure
TB	Tuberculosis
The Union	International Union Against Tuberculosis and Lung Disease
USAID	United States Agency for International Development
WHO	World Health Organisation
XDR-TB	Extensively Drug Resistant Tuberculosis

Foreword

The Myanmar National Tuberculosis Programme (NTP) under the leadership of Ministry of Health and Sports has made significant achievements in reducing the tuberculosis (TB) burden in the past two decades. The prevalence of TB has been reduced by 50 % from 922 to 461 (per 100,000 population) and the mortality rate has declined by 65% from 150 to 53 (per 100,000 population) between 1990 and 2015. But the public health burden of TB is still unacceptably high and we must overcome several remaining challenges.

Operational or Implementation Research, research that aims to improve programme implementation, plays an important role in TB control activities in Myanmar. To provide a roadmap and an agenda for conducting TB operational/ implementation research in the country, the NTP had coordinated research agenda development workshop in 2009 and 2014 in collaboration with Department of Medical Research. Several topics of research developed from the workshop were implemented and had provided evidence for improving the health care interventions to reduce TB burden in the country.

In 2016, the NTP developed the National Strategic Plan (NSP) for TB 2016-2020 and "Intensified Research and Innovation" is one of the three strategic directions under this plan. To align with the new NSP, the NTP initiated a research agenda development process with technical support from Department of Medical Research in collaboration with partner Non-Government organizations. We formed a technical working group to guide the process, and conducted a two-day workshop for identifying the National Operational/ Implementation Research priorities.

We have identified eight thematic areas in this report, and under each of this thematic area, a list of top priority topics are listed to guide operational research over next three years. The report also provides a suitable study design, method, and proposed institutions to conduct studies under these topics. I believe that this report will provide guidance to operational researchers who are interested in conducting TB related research and contribute towards effective control of TB in Myanmar.

Dr. Si Thu Aung
Program Manager (National Tuberculosis Programme)
Department of Public Health
Ministry of Health and Sports

Executive summary

Myanmar continues to be one of the 30 high tuberculosis (TB) burden countries in the world with an estimated annual incidence of ~197,000 TB patients. TB Control is one of the top priorities for the Myanmar's Ministry of Health and Sports. The National TB Programme has developed a National Strategic Plan (2016-2020) [NSP] to end the TB epidemic in Myanmar. The goal of the NSP is to help the country achieve a TB incidence of fewer than 10 cases per 100,000 population by 2035.

Several activities are being implemented as per the NSP. But evidence on what is working or what is not working, or how to implement the activities optimally in the context of Myanmar is needed to guide effective implementation of these activities so that they can have the desired public health benefit.

In July-August 2017, the National TB programme initiated and completed the process of identifying the operational/ implementation research priorities to achieve NSP objectives. A core working committee was established to guide the research agenda development process.

A multi-stakeholder participatory decision-making process was adopted to identify the research topics, and it was done in three steps. A national level workshop (with about 120 participants) was conducted on 26th and 27th July 2017 at Nay Pyi Taw. The participants were divided into eight thematic sub-groups.

- Accelerated case finding
- TB/DR-TB diagnosis
- MDR-TB management
- TB HIV
- Public-Private/ Public-Public Mix (PPM)
- Community engagement
- TB care in special populations (Children, elderly, migrant population, prisoners, DM)
- TB Epidemiology

The groups reviewed the NSP document and various other relevant national/ international reports/ documents, and have recommended 38 priority research topics. Research on these topics will either help in identifying the constraints/ challenges that National TB Programme is facing in implementing the activities as per the NSP or addressing these challenges/constraints. The topics are organized according to the eight sub-group themes. These topics are endorsed by the Department of Public Health and the Department of Medical Research, Ministry of Health and Sports, Government of Myanmar.

The National TB Programme invites researchers in the country to come forward, conduct research on these topics and provide evidence to inform decisions to address policy and practice gaps so that the country can eliminate tuberculosis as a public health problem at the earliest.

Background

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. TB usually affects the lungs (pulmonary TB), but any other part of the body can also be affected. Not all persons with TB infection develop the disease. Only about 10% of those infected develop the disease. The average duration of the disease from the onset to cure is about three years and without treatment, about 70% of the TB patients die within 10 years.[1] The classic symptoms of active TB disease are chronic cough with or without sputum, fever, night sweats, loss of appetite and weight loss. TB disease is diagnosed based on clinical symptoms, radiological features suggestive of TB and by the demonstration of TB bacteria in the body tissues, fluids, or secretions.[2]

There are a number of risk factors for TB infection and progression from infection to disease. These include infection with human immunodeficiency virus (HIV), tobacco smoking, exposure to silica dust, undernutrition, diabetes mellitus, malignancies, end-stage renal disease, chronic lung disease, and alcoholism. TB thrives in places where poverty, malnutrition and overcrowding coexist.

TB is a curable disease. The treatment of TB is generally for six months by a combination of antibiotics namely isoniazid, rifampicin, pyrazinamide, and ethambutol for the first two months, and rifampicin and isoniazid for the next four months. With this treatment, cure rates of more than 90% can be achieved. However, an irregular or inappropriate regimens of TB treatment can lead to multi drug-resistant TB (MDR-TB; resistance to isoniazid and rifampicin, the two most potent drugs used in the treatment of TB). MDR-TB is treated with at least four-five effective antibiotics for 18 to 24 months.

TB spreads through the air when people who have active TB in their lungs cough, spit, speak, or sneeze. TB control is primarily dependent on early diagnosis and treatment of all TB cases in the community so that individuals with the disease can be cured and the transmission of infection from diseased person to other persons in the community can be prevented.

TB burden in Myanmar

Myanmar with a population of 51.4 million people (2015) is one of 30 high TB burden countries in the world. In 2015, the TB incidence rate was estimated to be about 365 per 100,000 population (95% CI: 267-479). The incidence rate indicates that ~ 197,000 (144,000-258,000) new persons develop TB disease every year in the country. In 2015, approximately 27,000 (95% CI: 16,000-40,000) people were estimated to have died due to TB. The trends in the incidence and mortality rates since 2000 are shown in **figure 1**. As it can be seen the incidence rate had declined from 411 per 100,000 population in 2000 to 365 per 100,000 population in 2015; the mortality rate has declined from 150 per 100,000 in 2000 to 49 per 100,000 population in 2015. The declining incidence and mortality rates can be (in part) attributed to the huge increase in the number of TB cases detected and treated under the National TB programme.

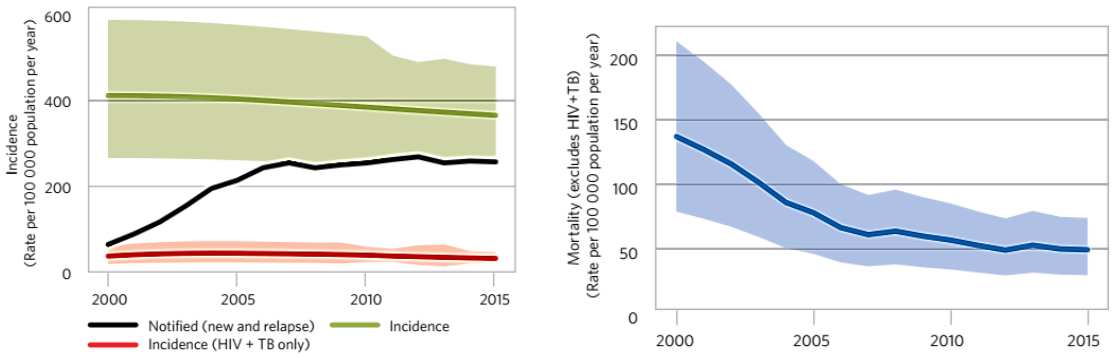

Figure 1: Trends in the incidence and mortality rates in Myanmar from 2000-2015 (Source: Global TB Report, 2016)

Myanmar is also one of the high burden countries for MDR-TB. An estimated 9,000 patients (95% CI: 6400-12,000) of MDR-TB occurred among notified pulmonary TB in 2015, 2,793 MDR-TB cases were diagnosed in 2015 and 10 extensively drug-resistant TB (XDR-TB) were detected in 2014. The prevalence of MDR-TB among new TB cases is about 5.1% (95% CI: 3.2-7) and the prevalence of MDR-TB among previously treated TB cases is about 27% (95% CI:15-39) and is showing an increasing trend.[3]

The country also has one of the most severe HIV/AIDS epidemics in Asia. Prevalence of HIV infection among the adult population was 0.54% in 2014 with an estimated 212,000 people living with HIV. Each year, there are about 9,000 new patients with TB/HIV co-infection.[4]

Case notification rates and treatment outcomes of TB patients in 2015

As per the WHO global TB report (2016), in 2015, the Myanmar National TB Programme notified 140,700 patients which included 138,447 new and relapse patients. About 88% of these patients were pulmonary and 39% of the pulmonary TB patients were bacteriologically confirmed. HIV status of 65% of notified TB patients was known and 9% of them were HIV positive. 38% of the HIV positive TB patients were on antiretroviral therapy.

About 22% of these notified patients were tested with rapid diagnostics (7% of the new patients and 46% of the retreatment patients were tested for rifampicin resistance). About 2,800 patients were confirmed as MDR-TB or rifampicin resistant TB patients of which 2,200 (78%) patients were initiated on treatment. Eleven patients of XDR-TB were diagnosed in 2015 of which 7 patients were initiated on XDR-TB treatment.

Among new and relapse patients registered in 2014, the treatment success was 87%. The treatment success rate among previously treated patients (excluding relapse) was 73%, and treatment success rate of HIV positive TB patients was 70%. Among MDR/ Rifampicin resistant-TB patients started on second-line treatment in 2013, the treatment success rate was 83%.

In terms of preventive therapy, about 10% of the HIV positive people received isoniazid preventive treatment. About 4% of the children aged less than 5 years who were contacts of bacteriologically confirmed TB patients were on preventive treatment.

Overall, the TB notification in relation to estimated incidence in 2015 was 70% (95% CI: 54% to 96%). The result of the recent nationwide survey showed that 60% of the households of TB and MDR-TB patients were found to have faced catastrophic costs due to TB. The TB case fatality ratio (estimated mortality/estimated incidence) in 2015 was 16% (95% CI: 10% to 26%).

National Strategic Plan (2016-2020)[5]

Controlling TB is one of the top priorities for the Myanmar's Ministry of Health and Sports. The National TB Programme has developed a National Strategic Plan (2016-2020) [NSP]—which is in line with the World Health Organization's (WHO) End TB Strategy—to end the TB epidemic in Myanmar. The goal of the NSP is to help the country achieve a TB incidence of fewer than 10 cases per 100,000 population by 2035.

The three key objectives of the NSP are: a) Accelerate the decline in the prevalence of drug-sensitive and drug-resistant TB; b) Fully integrate TB prevention and care in universal health coverage; c) Enhance prevention of TB particularly for high risk populations.

The NSP outlines three strategic directions for achieving these objectives. They include: a) integrated patient centred care and prevention; b) bold policies and supportive systems; c) intensified research and innovation.

Several activities have been enlisted under these strategic directions for implementation. But evidence on what works, what does not work or how to implement activities optimally in the context of Myanmar is needed to guide effective implementation of these strategies and the activities so that they can have the desired public health benefit. More than 20 national and international non-governmental organizations (NGOs) are supporting the National TB Programme in implementing the activities as per the NSP.

Key challenges for controlling TB in Myanmar

The key challenges are: a) obtaining adequate funds for sustaining the TB control activities beyond 2020; b) having adequate human resources in place for implementing all the planned TB control activities and maintaining their high levels of motivation; c) decreasing the gap (~30%) between the estimated number of patients in the country and the number of patients detected and notified to the NTP; d) decreasing the gap (~22%) between diagnosis and enrollment of patients for MDR-TB treatment; e) enhancing laboratory capacity for detecting patients with additional infrastructure; f) implementing infection control measures at health facilities and in communities; g) reaching the unreached populations (improving accessibility of TB control services in remote hard to reach areas); g) improving supervision and monitoring at all levels.

Operational Research/ Implementation Research

One of the simplest and most comprehensive definitions of Operational research is "search for knowledge on *interventions, strategies* or *tools* that can enhance the quality or coverage of health systems and services".[6] The Global Fund, defines operations research as "any research producing practical usable knowledge (such as evidence, findings, information) which can improve programme implementation (e.g., effectiveness, efficiency, quality, access, scale-up, and sustainability) regardless of the type of research (design, methodology, approach)".[7] Conceptually, the terms operational research and implementation research mean the same and both can be used synonymously.

Operational research has been used for understanding various aspects of implementation ranging from what is to be implemented, how it has to be implemented, knowing the status of implementation of the planned activities to assessing the impact of these activities on tuberculosis control. Operational research is not defined by the methodology used, but by the type of research/ implementation related questions that it tries to answer. Research questions are generated by identifying constraints or challenges in implementing planned activities. Answers to these research questions have direct, practical relevance to solving these constraints/ challenges and improving the efficiency of services.

Operational research in the past has been used to improve the outcomes of public health programmes, for assessing the feasibility of implementing strategies or newer guidelines and also to influence changes in policies and practices.[8]

There are several enabling factors that help in the conduct and completion of operational research studies.[8] First, direct programme relevance: research question must be relevant to programme implementation and connected to health service delivery. There must be a coordination mechanism to provide a clear strategy

about the setting of research priorities. Second, Partnerships: between researchers, policymakers, programme managers: a "partnership model" that promotes better *involvement*, *co-ownership* and *responsibility* of programme staff with researchers. Third, building operations research capacity and providing time and resources for conducting operations research. Fourth, retaining and engaging trained researchers. There must be a mechanism in place to use these researchers in conducting programmatically relevant research. Evidence from WHO/TDR, MSF, The Union, indicates that there is a 'critical mass' of researchers, which when achieved, can result in a substantial increase in the number of research studies that can be done. Fifth, non-governmental organisations (NGOs) also play a role in operations research as they are implementers working with vulnerable groups (e.g., prisoners, commercial sex workers, hard to reach population). Engagement of service programmes from MOHS in every step of operational research is crucial for utilization of research and translation of research into policy and practice. Therefore, MOHS must have a strong stewardship for implementation of operational research. Finally, there must be regular assessment of the number of operational research protocols developed, number of studies completed, number of studies published and the impact of the studies on changes in policies and practices.

The guiding principles in developing an operational research agenda are: first, to define program/health system objectives; second, understanding what interventions/activities are being implemented to achieve these objectives; third, identifying constraints to achieving objectives or implementing the activities, fourth, asking research questions around constraints.

TB Research in Myanmar

In 2014, the National TB programme in Myanmar had identified 20 priority OR topics for implementation. These are listed in Annex 1. By the end of July 2017, seven out of these 20 studies were either completed or in progress. The list of these studies are as follows:

1. Assessment of patient satisfaction in community-based TB care (completed)
2. Factors for sustainability of community volunteers for TB control (completed)
3. TB treatment outcomes among diabetic patients (completed)
4. Risk factors for DRTB: with special emphasis on MDR among new patients (completed)
5. Social determinants of TB transmission among people living in hilly regions (in progress)
6. Effectiveness of community-based MDR TB care by community supporters and basic health staff (BHS) (in progress)
7. Cost effectiveness of active case finding for tuberculosis (In progress)

Apart from this, several TB related research studies have been conducted in Myanmar and published in peer-reviewed national and international scientific journals. A list of all the research studies published in peer review journals from Myanmar for the period 2015- 2017 is given in Annex-2.

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Methodology for research agenda development

Approval for development of the research agenda

The National TB Programme obtained approval for the research agenda development from the Ministry of Health and Sports in the month of May 2017. It was also agreed that The Union and the DMR would provide technical support for this process. The overall aim of the research agenda development process was to identify operational/implementation research topics that would help National TB Programme achieve NSP objectives.

Core committee

In order to provide guidance to the research agenda development process, a core committee consisting of representatives from the Department of Medical Research, National Tuberculosis Programme, World Health Organization, The Union, and FHI-360 was formed in June 2017. This core committee interacted through e-mails and through an in-person meeting on 4th July 2017 and decided on the following issues.

- The 3-step prioritisation process of research agenda development
- The workshop dates (26 and 27th July 2017) and the timetable for this workshop. The timetable is given in Annex 3.
- Finalisation of the list of stakeholders and workshop participants who would be involved/invited in this research agenda development process
- Formation of the following eight thematic sub-groups under which the research topics will be identified.
    - Accelerated case finding
    - TB/DR-TB diagnosis
    - MDR-TB management
    - TB/HIV
    - Public-public/ public-private mix
    - Community engagement
    - TB care in special populations (Children, elderly, migrant population, prisoners, DM)
    - TB Epidemiology
- Identification of sub-group facilitators, rapporteurs and members of these groups. The participants comprised of a mixture of programme managers, professors/faculty of medical schools and universities, researchers from the Department of Medical Research and members from national and international non-governmental organisations. The group members are listed in Annex 4.
- Selection of national and international background documents that each of these groups will review in order to identify the research topics (thematic group-wise list of background documents provided to participants is given in Annex 5)
- Travel/ hotel/ Administrative/ logistic issues regarding the workshop on 26th and 27th July.
- The table of contents of the report of the research agenda development process.

The 3-step prioritization process of research agenda development

The research agenda development and prioritization process was done in three steps. A multi-stakeholder participatory decision-making process was adopted in order to prioritize the research topics. The first two steps were completed in the workshop conducted on 26th and 27th July 2017.

In the first step, a line list of all the potential research topics was prepared by the members of each thematic sub-group. For line listing, the groups reviewed the NSP document and other relevant national/international background documents and identified the NSP objectives/activities that were relevant to their group. For each NSP objective/activity, they discussed the constraints/ challenges in achieving the NSP objective, whether the activities planned will help the NSP achieve its objective (policy gaps), if there are no policy gaps, and whether the activities are/were being implemented as planned (practice gaps). They then discussed what studies are required to generate evidence to address policy and/ or practice gaps (pilot studies, feasibility studies, studies to assess the status of implementation, if the status of implementation is known and if there are any gaps, studies on interventions to address those gaps). The list of topics line listed are shown in Annex 6.

In the second step, among the line list of the potential topics, the thematic sub-groups identified a list of about 5 “top-priority” topics. This list was identified based on the group’s opinion on the importance of the topic for the NTP, importance of the topic for Myanmar’s TB control, and the anticipated urgency on the evidence needed. The thematic sub-groups resorted to a voting process, if there was no consensus on these top priority topics. For each topic listed under “top priority” they outlined a brief rationale about why this topic is important, key research question/s, suggested methodology (cross sectional study, cohort study, community based randomized controlled study, single site study, multi-centre study etc.), the timeline for this study and suggested institutions/organizations/ researchers that should take the lead in getting the study done. Following this, the groups presented their 5 “top-priority” research topics to all the participants of the workshop in a plenary session and the merits and de-merits of each topic were discussed. The groups received several suggestions/comments and based on this they made their final recommendations of the 5 “top-priority” topics. These discussions are summarized in Annex 7**.** Collectively the 8 thematic sub-groups recommended a list of 38 “top priority” research questions. This list was shared with the National TB Programme and the core working group members.

In the third step, the National TB Programme in consultation with the Department of Public Health and members of the core working group reviewed the workshop recommendations and made the final decision on the research topics, lead institutions and timeline to conduct each research topic.

Operational Research priorities/ recommendations

Theme-1: Accelerated case finding

Suggested research topic	Rationale	Key research question	Suggested Methodology		Proposed lead Organization/ Institution
1.1. Occurrence of TB among household contacts of bacteriologically confirmed index TB cases and barriers for implementing contact investigation in selected townships	Contact investigation is one of the recommended ACF activities by WHO. However, its implementation in Myanmar is poor. Interpretation of the yield of TB cases from available data is not possible	What are the barriers to implementing contact tracing? How many TB patients can be detected from contact investigation with NTP's standard operating procedure?	Prospective/ cross-sectional	1 year	NTP
1.2. Patient-centred care (ACF mobile team) perception on mobile team activity by attendees and their community	No assessment of community perception on mobile team activity. The NTP can improve mobile team case finding services from the results.	Are the community and mobile team attendees satisfied with TB mobile team activity?	Cross sectional, Qualitative (to village leaders and ACF attendees)	1 year	Implementing partners
1.3. Finding of missing TB cases through school-based ACF	26% missing cases To identify missing TB cases by school based activities	Whether high school students can contribute to TB case detection?	Intervention study (site selection-urban slum areas)	1 year (2018)	Academic institutions
1.4. Factors influencing the performance of Sputum Collection Centres (SCC) in selected townships	Case finding in remote areas is very low; Sputum collection at some of the SCC is low or not functioning according to plan	What are the factors influencing the performance of SCC in selected townships? Does the assigned SCC follow SOP?	Cross sectional comparative study Compare low and high-performance SCC	1 year (2018)	Academic institutions

Theme-2: TB/ DR-TB diagnosis

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
2.1. Usefulness of GeneXpert (GXP) on stool samples and gastric lavage for diagnosis of childhood TB cases	The diagnosis of pulmonary tuberculosis (PTB) remains challenging in children Difficulty in using gastric lavage in children	Can GeneXpert be performed on stool samples in place of gastric lavage in children for diagnosis of pulmonary TB? Can we change the diagnostic algorithm of GeneXpert for childhood TB to include GeneXpert tests on stool samples?	Cross sectional comparative study	1 year	NTP/Academic Institutions
2.2. Pyrazinamide (PZA) drug susceptibility pattern among Rifampicin resistant patients using both genotypic and phenotypic tools	Limited baseline data on PZA drug susceptibility pattern Data on PZA resistance required to assess whether PZA can be used (or not) in MDR-TB shorter regimen	Is PZA resistance rate high in RR-TB patients? Can more patients be detected by using both genotypic and phenotypic tools?	Cross sectional study	1 year	NTP/DMR
2.3. Effectiveness, quality and cost effectiveness of centre of excellence (COE) for MDR-TB diagnosis and management at the district level	COE model for TB control is developed as there was a huge burden due to TB patients on current health services due to limited resources and lack of knowledge on TB	What is the impact of COE model for MDR-TB diagnosis and management at the district level in Myanmar context?	Cluster randomized intervention study	2-3 years	NTP
2.4. Barriers and enablers for sustaining participation of microscopy centres (MCs) in EQA and factors contributing to the quality of microscopy centres	Unstable participation of some MCs in EQA program Quality of MCs is fluctuating Unacceptable performance of MCs	What are the barriers and enablers for sustaining the participation of MCs in EQA? What factors contribute to the quality of MCs?	Qualitative study (key informant interview, in-depth interview, focus group discussion)	1 year	NTP/DMR

Theme-3: MDR-TB management

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
3.1. Situational analysis of the treatment in diagnosed DR-TB patients	NSP target for diagnosing and treating XDR-TB in 2017 is 30. Currently, only 3 patients are enrolled for treatment. Pre-treatment loss to follow-up among pre-XDR/XDR TB patients is 50%, while among diagnosed MDR/RR-TB patients the loss to follow up is 21%	What are the barriers to diagnosis and treatment of pre-XDR/XDR and MDR-TB in Myanmar?	Qualitative Study	6-12 months	Academic institutions
3.2. Analysis of unfavourable outcomes of MDRTB patients	In 2014 cohort of MDR-TB patients, 19% had unfavourable outcomes. To achieve the NSP target of >82% treatment success rate, there is a need to explore reasons for the unfavourable outcome.	What factors are contributing to the unfavourable outcomes among MDR-TB patients?	Case control study	6-12 months	NTP
3.3. Assessment of health literacy on MDRTB in the general community	Currently, there is no baseline data on level of health literacy on MDRTB among community	What is the level of health literacy on MDR-TB among the community?	Quantitative study (checklist questionnaires)	6-12 months	NTP
3.4. Infection control status at health care facilities; Awareness and practices on infection control measures for MDR-TB among health care providers (HCP) in health facilities	As per NSP, only 30% of health care facilities are compliant with the recommended infection control measures	1) What are the compliance levels towards infection control measures at health facilities (TB clinic, ART centres, Decentralized sites, MMT sites including one stop service)? 2) What proportion of health facilities are aware of standard infection control guidelines?	Health Facility survey; quantitative study (questionnaires and checklist)	6-12 months	NTP
3.5. Factors associated with occurrence of TB/MDR-TB disease among contacts of MDRTB patients	Contacts of MDR-TB are at high risk for getting infected with TB/MDRTB. Globally, 3-5% of MDRTB contacts have MDR-TB.	What is the yield of TB/MDRTB among MDRTB contact? What are the factors associated with the occurrence of TB/MDRTB cases among contacts of MDRTB?	Cross sectional comparative study	6-12 months	NTP/ Implementing partners

Theme-4: TB-HIV

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
4.1. Diagnosis and treatment initiation of TB and HIV including referral and feedback mechanism	Only 58% of registered HIV +ve TB patients received ART in 2016 (while NSP target is 65%). Inadequate ART coverage among TB/HIV co-infected patients Percentage of TB screening among PLHIV is satisfactory but no information on frequency of TB screening according to guideline No information on the time to diagnosis and time to treatment for both TB and HIV	How long is the time to diagnosis and time to treatment for both TB and HIV? Is there any gap in referral and feedback mechanism between NTP, NAP and IPs? What is the frequency of TB screening among PLHIV?	Prospective cohort study and qualitative	1 year	NTP
4.2. Acceptance and barriers to utilization of IPT by providers and patients	IPT provision (only 13% of PLHIV received IPT in 2016) did not achieve the NSP target in 2016 (50% of all newly enrolled PLHIV received IPT 2016-2020) Insufficient implementation of IPT	What is the perception of health care providers and patients on the provision of IPT to PLHIV?	Qualitative study	1 year	NTP
4.3. Quality of care for MDR-TB and HIV among co-infected patients	Of 11,000 HIV/TB patients, 300 were MDR-TB, and there is no information on the ART provision among HIV/MDR-TB patients. No information on provision of care and treatment among HIV/MDR-TB co-infected patients	Is the treatment of MDR-TB and HIV according to the WHO & national guidelines?	Cross-sectional study	1 year	NTP
4.4. Data quality and challenges in implementation of DHIS-2	Electronic recording and reporting system (DHIS 2) was started at state and regional level and providers need to know how to apply this tool in TB care	What are the challenges in implementing NTP recording and reporting system through DHIS 2? How valid is the data quality after implementation of DHIS 2?	Qualitative and Cross-sectional assessment of data quality	Baseline study followed by once every year assessment	NTP
4.5. Evaluation of TB/HIV collaborative activities before and after training	At present the coordination between NAP, NTP, IPs and private sectors weak	Are there any improvements in TB/HIV collaborative activities after training at all levels?	Process evaluation	1 year	DMR/ Academic institutions

Theme-5: Public Private/ Public-Public Mix (PPM)

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
5.1. Geo-social mapping and involvement of general practitioners (GPs) in TB control program in selected townships of Myanmar	Nearly 70% of GPs not participating in PPM (2014)	How many of GPs are not involved in TB control program?	Cross-sectional descriptive study (mixed method)	1 year	Academic institutions
5.2. Factors influencing involvement of registered drug sellers in TB control activities	Cases referred by drug sellers accounted for 11.9% of smear positive and 9.6% of all forms of TB (2012 Hlaing Township)	What are the factors influencing involvement of drug sellers in TB control?	Cross-sectional study	1 year	Academic Institutions
5.3. Role of unregistered drug vendors in TB case detection in selected townships	Studies show that 27.5% of the patients who had long-term cough self-medicated themselves and 13.6% received medicines from pharmacy	What is the number and proportion of unregistered drug vendors in selected townships? How many additional cases can be detected by involving unregistered drug vendors in TB case detection?	Cross-sectional descriptive (Mapping, Advocacy and referral linkage)	2 years	Academic institutions
5.4. Assessment of data quality in recording and reporting system of TB cases managed under PPM projects	The recording and reporting system is important in supporting program policy implementation. (To guide all program decisions).	To assess the current recording and reporting system To monitor and improve data consistency, completeness and validity	Observational study (cross-sectional)	Quarterly report (6 months)	NTP
5.5. Factors influencing treatment outcomes of drug sensitive TB cases in PPM clinics and hospitals	Treatment success rate for bacteriologically confirmed cases is 85% in NTP (Target achieved) but 81% in PPM units. Loss-to-follow-up rate is 6% in NTP and 8% in PPM centres.	What are the factors influencing treatment outcomes in PPM clinics and hospitals?	Cross-sectional study	1 year	Academic institutions

Theme-6: Community engagement

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
6.1. Integration of existing Community Based Organizations (CBO) and charity organizations in TB care activities	There are many existing CBOs in the community which are providing both health-related and non-health related services. If they are engaged and involved more in TB care activities, the public will have access to more quality services.	What is current status of involvement of CBOs' in TB control activities? What is the perception of existing CBOs on TB? How can CBOs contribute in TB control activities?	Cross Sectional (Mixed methods study)	1 year	NTP
6.2. Practical linkage system between Basic Health Staff (BHS) and Volunteers in TB Control activities	Coordination between BHS and volunteers is crucial for better TB diagnosis and treatment services. There are some weaknesses in the linkage between BHS and volunteers in the current situation. It is vital to develop a practical linkage system.	What is the current situation on the linkage between BHS and volunteers? How to strengthen/improve linkage in the practical field? What are the possible innovative linkage mechanisms?	Intervention study	2-3 years	NTP
6.3. Readiness and feasibility of engaging integrated community malaria volunteers (ICMV) in providing integrated health services	According to National Health Policy (NHP, 2017-2021), for government facilities to be able to deliver the Basic Essential Package of Health Services (EPHS) and ensure minimum standards of care, considerable investments in supply-side will be needed, starting at the level of the community. Integration of malaria volunteers in Community based TB Care (CBTBC) activities will be of great help for implementation of National TB control program as well as National Health Plan. According to NHP EPHS, ICMV will be trained for HIV, TB, Malaria, Dengue and Leprosy.	Are Integrated Community Malaria Volunteers (ICMV) ready to provide integrated services to the community? What are the acceptance and opinion of the programs and partners on engaging ICMV in providing TB care services?	Cross Sectional (Quantitative), Stakeholder Analysis	1 year	DMR/Academic institutions

6.4. Feasibility of engaging Self Help Groups in TB services	NSP has mentioned establishing additional self-help groups (SHG) working together with volunteers, BHS and the NTP. Although there are a few numbers of existing SHGs, not every SHG is well functioning. It is not clear whether SHGs can be engaged in community based TB care activities.	What is the expectation of SHG for involvement in community based TB care activities? What are the perception and opinion of TB patients regarding SHGs? What is the perception and opinion of Health Care Providers on engaging SHGs in TB care services?	Cross Sectional Study, Mixed Method	1 year	DMR
6.5. Possible approaches for funding sustainability of the Community Based TB care programs	Regular investment is required for providing community based TB care services. After 2020, there is the uncertainty of funds from international organizations. This can affect community based TB care activities. Therefore, it is vital to consider the sustainability of funding from various possible sources.	After 2020, if there is insufficient funding, is it possible to sustain CBTBC activities? What are the potential fund-raising opportunities for CBTBC? What are the roles of various stakeholders and CBOs for raising funds for CBTBC?	Cross Sectional Descriptive Study using Mixed Method; Mainly Qualitative Study	1 year	Academic institutions

Theme-7: TB care in special populations (Children, elderly, migrant population, prisoners, DM)

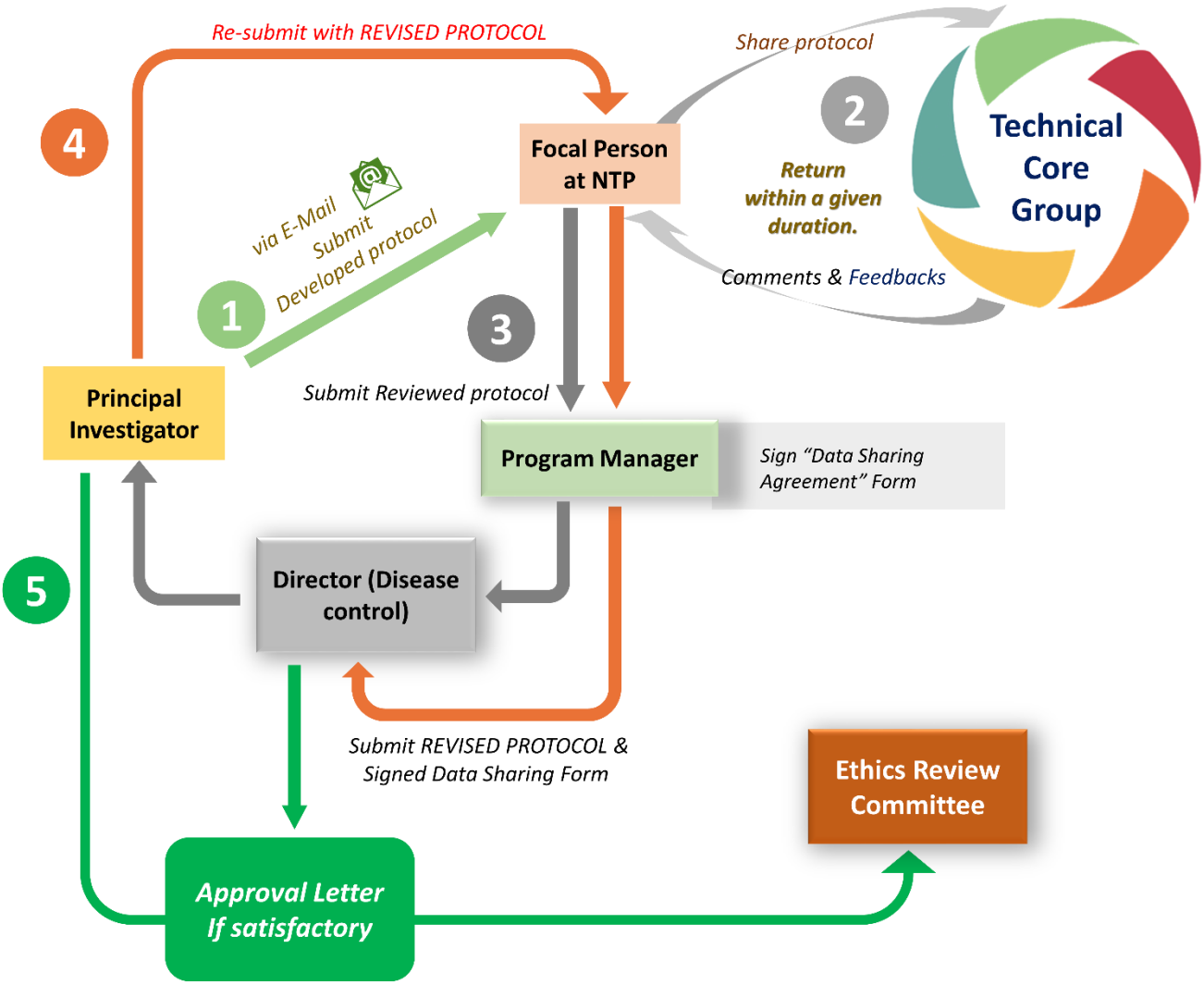
Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
7. 1. Bi-directional screening for TB and DM and assessment of referral pathway	TB prevalence among DM patients and DM prevalence among notified TB cases are not documented in Myanmar. TB and DM clinic can be located in different places and proper referral systems are needed to implement this activity.	What is the prevalence of TB among DM patients and DM among notified TB cases? What is the dropout rate between TB clinic and DM clinic and what are the clinical and socio-demographic factors associated with drop out?	Cross sectional study and retrospective cohort study	1 year	NTP
7. 2. Designing locally applicable strategy for TB prevention and control in Ethnic Health Organization	TB caseload was high in special regions. However, the utilisation of services is low and there is a high loss to follow-up. There is a need for identifying locally appropriate strategies for enhancing utilisation of services	What are the locally applicable strategies for TB prevention and control in special regions?	Qualitative study	1 year	DMR/ Medical Universities
7.3. Barriers for providing IPT to under 5 children who are household contacts of sputum smear positive pulmonary TB cases	Eligible children are not receiving IPT and the barriers for providing IPT are unknown	What are the clients and provider's barriers to providing IPT for under 5 children who are contacts of pulmonary TB cases?	Qualitative study	1 year	NTP
7.4. Assessment of TB related health seeking behaviours in migrants in peri-urban and cross border areas	Delayed diagnosis of TB in migrant population and high rate of lost to follow up in those populations. There is limited accessibility and acceptability health facilities.	What are the health seeking behaviours in a migrant population of peri-urban and cross border areas?	Cross sectional study	1 year	Implementing partners (IOM)
7.5. Readiness and feasibility of establishing sputum collection centres (SCC) in Naga area	Sputum collection centres can be established in hard to reach areas. However, there is a need to understand the challenges in establishing SCC in such areas.	Is it feasible to establish SCC in Naga area?	Qualitative study	1 year	Implementing partners (MAM)

Theme-8: TB Epidemiology

Suggested research topic	Rationale	Key research question	Suggested Methodology	Timeline (for completing the studies)	Proposed lead Organization/ Institution
8.1. Follow up of communities of nationwide 2017-2018 TB prevalence survey	To assess the epidemiological impact of the TB prevalence survey	Is there any decrease in TB incidence among communities that participate in national TB prevalence survey?	Prospective cohort study	2 years	To be undertaken by the NTP at a later date
8.2. Active surveillance of childhood TB (CTB) meningitis in children's hospitals	The decline in the incidence of TB meningitis is a good indicator of the impact of TB program performance. Data from the current routine surveillance shows a declining trend of CTB meningitis. However, it is uncertain if the decline is real. There is a need for establishing active surveillance system (by including a clinical and bacteriological assessment by specialists) to confirm the decline in CTB meningitis cases.	What is the trend in CTB meningitis disease? How can we achieve zero TB meningitis among children? What are the sources of infection for CTB meningitis cases?	Active surveillance	1 year	NTP
8.3. Prevalence and resistance patterns of MDR-TB among migrant populations	In migrant populations, transmission of MDR-TB cannot be controlled without knowing the prevalence and resistance patterns of MDR-TB	What is the prevalence and resistance patterns of TB among migrant populations (cross-border)?	Cross-sectional study	6- 12 months	NTP
8.4. Pilot/Feasibility study on establishing TB surveillance system in private hospitals	There are gaps in TB case notifications in private hospitals and there is no surveillance/ notification system to capture information on TB cases diagnosed and treated in the private sector	How many TB cases are diagnosed and/or treated in private hospitals? Of these, how many are reported to the national system?	Cross-sectional study	1 year	Implementing partners (MMA)
8.5. Early TB case detection and perception of TB among workers of transportation services in Yangon Region	Many workplaces such as buses (Yangon) and Taxis are overcrowded, and act at high risk places for TB/ MDR-TB transmission	What is the prevalence of TB among workers of transportation services in Yangon Region (YBS)? What is the opinion towards TB prevention in transportation services in Yangon Region?	Cross-sectional study/ qualitative study	6 months	Academic institutions

Process for receiving approval for operational research

Researchers who propose to undertake prioritized research topics are suggested to follow the process shown below to receive approval.



1. The Principal Investigator (PI) of the research project will develop and submit the electronic copy of the research protocol to the focal point at the NTP central office in Nay Pyi Taw. (The NTP will identify a focal point either from the NTP or WHO)
2. The focal point will distribute the protocol to the assigned reviewers of the TB research technical core group.
    a. Each assigned reviewer gives comments and returns the protocols to the focal point within a given duration.
3. The focal point will submit the protocol together with the reviewer's comments to the NTP Programme Manager (PM) and Director (Disease Control).
    a. PM (NTP) and the Director will review and provide their comments to the focal point.
    b. The focal point will return the protocol with the comments from the reviewers, PM and the Director to the PI.

4. PI will address the comments and re-submit the protocol with response to reviewers' comments to the focal point.
    a. The focal point will submit the revised protocol with response to reviewers' comments to NTP Programme Manager.
    b. After the programme manager reviewed the revised protocol, the data sharing agreement form will be signed by PM and PI if the revised protocol satisfactorily addresses the comments of the reviewers
    c. The focal point will submit the revised protocol and signed data sharing agreement form to Director (Disease Control).
5. PI will get approval letter from the disease control division (if all the comments are satisfactorily addressed) and will submit the protocol to Ethics Review Committee (either at Department of Medical Research or University of Public Health)

Annexures

Annex 1: List of OR priority topics from National OR agenda development workshop held in 2014

No	Research Topics
1	Integrated approaches for utilization of community volunteer in TB, HIV and HNCH
2	Effectiveness of community-based MDR-TB care by community supporters and BHS
3	Health-seeking behaviour and patients' barriers to diagnosis and treatment of MDR-TB
4	Cost-effectiveness of active case finding for tuberculosis
5	Assessment of patient satisfaction in community-based TB Care
6	Factors for sustainability of community volunteers for TB control
7	Economic analysis of community-based MDR-TB programmes
8	Establishment of screening for tuberculosis in cross border areas
9	Role and effectiveness of voluntary health workers in community-based TB care
10	Barriers to accessing TB screening and diagnosis
11	Role of community involvement in treatment adherence of TB patients
12	Causes of compliance in standard MDR-TB regimens
13	Accessibility to services related to diagnosis and treatment of tuberculosis
14	effective was of communication to improve TB knowledge among community
15	Social determinants of TB transmission among people living in hilly regions
16	Factors influencing treatment of tuberculosis among migrant populations
17	Factors influencing delays in treatment of MDR-TB
18	Prevalence and resistance patterns of MDR-TB among migrant populations
19	TB treatment outcomes among diabetic patients
20	Risk factors for DRTB: with special emphasis on MDR among new patients

Annex 2: List and summary of TB research studies from Myanmar published in peer reviewed scientific journals during the period 2015-2017

Research theme				
No.	**Title**	**Main Findings**	**Implications**	**Reference**
TB Drug resistance pattern and genotyping				
1	Phenotypic and genotypic analysis of anti-tuberculosis drug resistance in Mycobacterium tuberculosis isolates in Myanmar.	Of 191 isolates, phenotypic DST showed that 27.7% (n=53) were resistant to at least one first-line drug and 20.9% (n=40) were resistant to two or more, including 18.3% (n=35) multidrug-resistant TB (MDR-TB) strains. Mono-resistant strains accounted for 6.8% (n=13) of the samples. Genotypic assay of 189 isolates showed 17.5% (n=33) MDR-TB and 5.3% (n=10) isoniazid-mono resistant strains. Genotypic susceptibility results were 99.5% (n=188) concordant and agreed almost perfectly with phenotypic DST (kappa=0.99; 95% confidence interval 0.96-1.01).	The results highlight the burden of TB drug resistance and prove the usefulness of the genotypic DST in Myanmar.	Ann Lab Med. 2015 Sep;35(5):494-9.
2	Drug-resistant tuberculosis among previously treated patients in Yangon, Myanmar	Sputum samples with acid-fast bacilli grading 2+ or 3+ from 96 previously treated patients were collected and referred to the National Tuberculosis Reference Laboratory, Yangon, between October 2012 and August 2013. Among 96 patient MTB isolates, 80 (83.3%) were MDR by phenotypic DST. Patients in the 19–40 years age group were at greater risk for MDR-TB compared with the 41–60 years age group. Patients living in East and North Districts of Yangon Region were more likely to have MDR-TB than those living in South District. The most frequently observed resistance mutations were the rpoB S531L (rifampicin) and katG S315T (INH), identified in 67 (84.0%) and 77 (96.0%) of MDR isolates, respectively, and consistent with previous studies. One isolate had INH resistance results discrepant between the MTBDR plus and phenotypic DST result; INH-susceptible by MTBDR plus, but INH-resistance by phenotypic DST. We used whole-genome sequencing (WGS) to resolve this disagreement and detected a rare mutation G299C in katG conferring INH resistance in this isolate highlighting the added value of WGS in the diagnosis of drug-resistant TB. Treatment after failure patients were more likely to have MDR-TB than relapse patients, suggesting that construction of effective regimens is needed to successfully treat drug resistant TB patients.	In summary, rapid diagnostics such as GeneXpert at township TB centers especially in North and East Districts of Yangon Region and ultimately, whole-genome sequencing at the National TB Reference Laboratory should be considered for effective diagnosis and treatment to reduce transmission of MDR-TB in Yangon Region.	International Journal of Mycobacteriology 5(2016) 366-367

3	Genotypic characterization of multi-drug-resistant Mycobacterium tuberculosis isolates in Myanmar.	During 2010, the common mutations in the rpoB, katG and inhA of 178 phenotypically MDR M. tuberculosis isolates collected by the National Tuberculosis Control Program (NTP) in Myanmar were investigated by DNA sequencing. Mutations affecting the 81-bp rifampicin (RIF) resistance-determining region (RRDR) of the rpoB were identified in 127 of 178 isolates (71.3%). Two of the most frequently affected codons were 531 and 526, with percentages of 48.3% and 14.0% respectively. For isoniazid (INH) resistance, 114 of 178 MDR-TB isolates (64.0%) had mutations in the katG in which a mutation-conferring amino acid substitution at codon 315 from Ser to Thr was the most common. Mutations in the inhA regulatory region were also detected in 20 (11.2%) isolates, with the majority at position -15.	Distinct mutation rate and pattern from surrounding countries might suggest that MDR-TB has developed and spread domestically in Myanmar.	J Infect Chemother. 2016 Mar;22(3):174-9.
4	Whole-genome sequencing of multidrug-resistant Mycobacterium tuberculosis isolates from Myanmar.	Fourteen multidrug-resistant Mycobacterium tuberculosis isolates were sequenced. Known resistance genes for a total of nine antibiotics commonly used in the treatment of drug-susceptible and multidrug-resistant TB (MDR-TB) in Myanmar were interrogated through WGS. All 14 isolates were MDR-TB, consistent with the results of phenotypic drug susceptibility testing (DST), and the Beijing lineage predominated. Based on the results of WGS, 9 of the 14 isolates were potentially resistant to at least one of the drugs used in the standard MDR-TB regimen but for which phenotypic DST is not conducted in Myanmar.	This study highlights a need for the introduction of second-line DST as part of routine TB diagnosis in Myanmar as well as new classes of TB drugs to construct effective regimens.	J Glob Antimicrob Resist. 2016 Sep;6:113-7.
5	Multidrug-resistant Mycobacterium Tuberculosis Strains in Myanmar Patients	A total of 139 high-positive sputum samples (i.e., AFB grade 2+ or 3+) from MDR-TB suspected cases which were referred to National TB Reference Laboratory, Yangon during 2012-2013 were included in this study. The most common rifampicin resistance mutation was S531L (67.5%) in the rpoB gene and the most prevalent isoniazid resistance mutation was S315T (90.4%) in the katG gene. There was high agreement (kappa=0.934) between the MTBDR plus assay and phenotypic susceptibility results in detecting MDR-TB. The inhA C15T mutation was more likely to occur in isoniazid mono-resistant cases than in MDR-TB cases ($p=0.038$). Beijing genotype was predominantly identified in 76.4% of strains (55/72). Strains belonging to Beijing genotypes are significantly associated with MDR-TB ($p=0.001$) as well as resistance to isoniazid, rifampicin, streptomycin and ethambutol (all $p<0.05$). The katG S315T mutation was more likely to develop in strains of Beijing genotype ($p=0.009$).	This study provides relevant data which can be applied for the development of new and better tools (diagnostics, therapeutics, vaccines) for effective measures in the control of drug-resistant tuberculosis in the country. It also gives information on the general anti-TB drug resistance status in Myanmar patients.	Myanmar Health Science Research Journal Health Sciences Research Journal, 2017 (29)1:552-57

6	Extensively Drug Resistant Tuberculosis in Myanmar: Its burden and mutations in the second-line drug targets	Multidrug-resistant Mycobacterium tuberculosis isolates were collected during 2015-16. Phenotypic drug susceptibility testing was performed and drug-resistant mutations were identified using sequencing. Genotypes were determined to explain the relations of drug resistant patterns with genotypes. Out of 89 multidrug-resistant tuberculosis isolates; 12 were extensively drug-resistant, and 24 were pre-extensively drug-resistant TB with 21 fluoroquinolones and 3 second-line injectable-resistant TB. The results showed high proportions of cross-resistance among second-line drugs. The correlations between phenotypic and molecular drug susceptibility testings for fluoroquinolones and second-line injectable drugs were 91% respectively. The most frequent mutation for fluoroquinolone-resistant was D94G (8/21) in gyrA and A1401G (11/15) in rrs for second-line injectable drugs. The dominant genotype was Beijing type (76/89).	The study suggests that drug resistances for the second-line anti-tuberculosis drugs should be monitored intensively, and molecular drug susceptibility tests also should be considered to apply.	Accepted to be published Int J Tuberc Lung Dis.
TB care in special population				
7	Challenges in tackling tuberculosis on the Thai-Myanmar border: findings from a qualitative study with health professionals.	The study conducted in-depth interviews with health policymakers and health care providers responsible for developing and implementing policies and TB programs in Tak province, Thailand and Myawaddy district, Kayin state, Myanmar. A total of 31 respondents (18 in Thailand and 13 in Myanmar) participated in the study. The main theme reported by participants was challenges in limited corroboration and coordination among stakeholders. Unstructured information sharing and lack of communication hindered the stakeholders from engaging in TB control. The respondents stressed that referral mechanisms across the border need to be strengthened. Other challenges were associated with increasing loss to follow up and subsequent MDR cases, constraints of service delivery, shortage of human resources, limited staff capacities within organizations and poor socioeconomic status of patients.	The study shows that health professionals face many challenges in effectively addressing TB control.	BMC Health Serv Res. 2015 Oct 9;15:464.

8	Migration histories of multidrug-resistant tuberculosis patients from the Thailand-Myanmar border, 2012-2014.	Twenties MDR-TB patients on the Thailand-Myanmar border were interviewed with regard to their migration histories. Migration origins and destinations were mapped. All but one participant had a history of migration, and maps of migration ranges revealed wide geographic dispersal. Most described living and work conditions that could contribute to the spread of drug-resistant TB, including numerous contacts and crowded living quarters.	The study results show that at least some migrant workers in the region carry MDR-TB, and indicate that this subgroup of the population is important with regard to the transmission of MDR-TB throughout the region. Migrants in this region come into contact with high numbers of people and may be able to spread the disease across wide geographic ranges.	Int J Tuberc Lung Dis. 2017 Jul 1;21(7):753-758.
9	Treating the invisible: Gaps and opportunities for enhanced TB control along the Thailand-Myanmar border.	The study identified surveillance, treatment, and funding gaps. Migrant TB cases are underreported in the provincial statistics due to jurisdictional interpretations and resource barriers. The results suggest that TB/HIV and MDR-TB treatment options are limited for migrants and a heavy reliance on donor funding may lead to potential funding gaps for migrant TB services. The study identified several opportunities that positively contribute to TB control in Tak province: improved diagnostics, comprehensive care, and collaboration through data sharing, planning, and patient referrals. The various organizations providing TB treatment to migrant and refugee populations along the border and the Tak Provincial Public Health Office are highly collaborative which offers a strong foundation for future TB control initiatives.	The study identified several opportunities that positively contribute to TB control in Tak province: improved diagnostics, comprehensive care, and collaboration through data sharing, planning, and patient referrals. The various organizations providing TB treatment to migrant and refugee populations along the border and the Tak Provincial Public Health Office are highly collaborative which offers a strong foundation for future TB control initiatives.	BMC Health Serv Res. 2017 Jan 13;17(1):29.

TB and poverty				
10	The effect of household poverty on tuberculosis	TB prevalence surveys from Malawi, Mongolia, Myanmar, the Philippines, Rwanda, Tanzania, Viet Nam and Zambia were analysed to assess the relationship between household socio-economic level, both relative and absolute, and individual tuberculosis (TB) disease. Overall, a strong and consistent association between household SEL and individual TB disease was not found. Significant results were found in four individual country models, with the lowest socioeconomic quintile being associated with higher TB risk in Mongolia, Myanmar, Tanzania and Viet Nam.	TB prevalence surveys are designed to assess prevalence of disease and, due to the small numbers of cases usually detected, may not be the most efficient means of investigating TB risk factors. Different designs are needed, including measuring the SEL of individuals in nested case-control studies within TB prevalence surveys or among TB patients seeking treatment in healthcare facilities.	Int J Tuberc Lung Dis. 2016 Dec 1: 20(12):1603-8
Active TB case finding activities				
11	Are current case-finding methods under-diagnosing tuberculosis among women in Myanmar? An analysis of operational data from Yangon and the nationwide prevalence survey.	Overall, only 514 (30%) out of 1371 new smear positive tuberculosis patients diagnosed at the township health centres were female. The proportion of female patients varied by township (from 21% to 37%, $p = 0.0172$), month of diagnosis (37% in February 2015 and 23% in March 2015 $p = 0.0004$) and age group (26% in 25-64 years and 49% in 18-25 years, $p < 0.0001$). Smear microscopy grading of sputum specimens was not substantially different between sexes. The prevalence survey analysis indicated that the use of a more sensitive diagnostic tool could result in the proportion of females diagnosed at township health centres increasing to 36% from 30%.	The study found that substantially fewer women than men were diagnosed in all study townships. The sex ratio of newly diagnosed cases varied by age group, month of diagnosis and township of diagnosis. Low sensitivity of tuberculosis diagnosis may lead to a potential under-diagnosis of tuberculosis among women.	BMC Infect Dis. 2016 Mar 3;16:110.

12	Cost-effectiveness of a new strategy to detect pulmonary tuberculosis in household contacts in Myanmar.	A modified conventional model included screening for TB signs and symptoms, sputum examination for those with positive signs and symptoms and chest X-ray (CXR) for those with negative sputum results. An interventional model included CXR, sputum examination if CXR was abnormal and Xpert® MTB/RIF assay for those with negative sputum results. The additional cost per TB case detected using the interventional model was US$35.41 compared to the modified conventional model. The probability that the interventional model was cost-effective using a threshold of US$100 per case detected was 81% (83% for those aged ≥15 years and 65% for those aged <15 years).	The interventional model was more cost-effective in detecting one more pulmonary TB case among household contacts than the modified conventional model.	Int J Tuberc Lung Dis. 2017 Feb 1;21(2):181-187.
13	Active case-finding for tuberculosis by mobile teams in Myanmar: yield and treatment outcomes.	A total of 9 349 people with symptoms suggestive of TB were screened by CXR, with an uptake of 96.6%. Of those who were meant to undergo sputum smear microscopy, 51.4% had sputum examinations. Finally, 504 TB patients were identified by the mobile teams and the overall contribution to total TB case detection in the respective townships was 25.3%. Among total cases examined by microscopy, 6.4% were sputum smear positive TB. Treatment success rate was high as 91.8% in study townships compared to national rate 85% (2014 cohort).	This study confirmed the feasibility and acceptability of ACF by mobile teams in hard-to-reach contexts, especially when equipped with portable, digital CXR machines that provided immediate results. However, the follow-up process of sputum examination created a significant barrier to confirmation of the diagnosis.	Infect Dis Poverty. 2017 Jun 2;6(1):77.
Community-based TB care				
14	Different challenges, different approaches and related expenditures of community-based tuberculosis activities by international non-governmental organizations in Myanmar.	Four INGOs assisted the NTP by providing CBTBC in areas where access to TB services was challenging. Each INGO faced different issues in their contexts and responded with a diversity of strategies. The total costs ranged from US$ 140 754 to US$ 550 221 during the study period. The cost per patient completing treatment ranged from US$ 215 to US$ 1 076 for new cases and US$ 354 to US$ 1 215 for retreatment cases, depending on the targeted area and the package of services offered. One INGO appeared less costly, more sustainable and patient oriented than others.	This study revealed a wide variety of models of care and associated costs for implementing CBTBC in diverse and challenging populations and contexts in Myanmar.	Infect Dis Poverty. 2017 Mar 24;6(1):59.

15	The contribution of a non-governmental organisation's Community Based Tuberculosis Care Programme to case finding in Myanmar: trend over time.	Over time, the number of presumptive TB cases that were referred decreased, except in the Yangon Region, although in some areas, the numbers fluctuated. At the same time, there was a trend for the proportion of cases treated, compared to those referred, that decreased over time ($P = 0.051$). Overall, among 84 townships, the contribution of CBTC to total case detection decreased from 6% to 4% over time ($P < 0.001$).	This study suggests that measures to support the volunteer network and improve its performance are needed.	Infect Dis Poverty. 2017 Apr 3;6(1):51.
16	International non-governmental organizations' provision of community-based tuberculosis care for hard-to-reach populations in Myanmar, 2013-2014.	A total of 21 995 presumptive TB cases were referred for TB diagnosis, with 7 383 (34%) new TB cases diagnosed and almost all (98%) successfully treated. The four INGOs contributed to the detection of, on average, 36% (7 383/20 663) of the total new TB cases in their respective townships (range: 15-52%).	Community-based TB care supported by INGOs successfully achieved TB case detection in hard-to-reach and vulnerable populations.	Infect Dis Poverty. 2017 Mar 24;6(1):69.
Public-Public/ Public-Private Mix				
17	Public-private mix for tuberculosis care and control in Myanmar: a strategy to scale up?	The Medical Association (MMA)- public-private mix (PPM)-TB project contributed 7501 (12%) of 60 905 TB patient notifications to the National Tuberculosis Programme (NTP) in 105 study townships. Of 2975 TB patients diagnosed and treated at private MMA-PPM clinics, 92% had a favourable outcome (32% cured, 60% completed treatment) and 8% had an unfavourable outcome (2.9% died, 2.5% lost to follow-up, 1.9% failure, 0.6% transfer out). Patient characteristics significantly associated with an unfavourable treatment outcome were age ≥65 years (adjusted risk ratio [aRR] 5.7, 95% confidence interval [CI] 4.20–7.68), retreatment (aRR 2.44, 95%CI 1.79–3.33) and female sex (aRR 1.44, 95%CI 1.14–1.82).	This study supports the continuation and expansion of the MMA-PPM-TB model and/or similar PPM approaches in Myanmar that engage all health providers in the ambitious goals of achieving universal health coverage in this country in transition and ending its TB epidemic by 2035.	Public health action. 2017; I: 14–8.

18	Engagement of the private pharmaceutical sector for TB control: rhetoric or reality?	A content analysis of global-level documents from WHO and the Stop TB Partnership in five phases showed that only two of 14 countries' national strategic plans had explicit statements on the need to engage their national pharmacy professional association The success rate of referrals from retail drug outlets who visited an approved health facility for TB screening was 86% in Myanmar.	For WHO's End TB Strategy to be successful, scaling up retail drug outlets to increase national coverage, at least in countries with a thriving private sector, will be instrumental in accelerating the early detection and referral of the 3 million missing TB cases. The proposed PPM pharmacy model is applicable not only for TB control but also to tackle the antimicrobial resistance crisis in these countries.	J Pharm Policy Pract. 2017 Jan 18;10:6.
Multi and extensively drug-resistant TB treatment and care				
19	First two extensively drug-resistant tuberculosis cases from Myanmar treated with bedaquiline	The study reports the first two XDR-TB cases in Myanmar that were confirmed by both whole-genome sequencing (WGS) and phenotypic drug susceptibility testing (DST), and consequently enrolled in the regimen consisting of bedaquiline through the EndTB program. Both patients were diagnosed with rifampicin resistance by GeneXpert as part of routine diagnosis and were treated with the standardised MDR-TB regimen containing amikacin, pyrazinamide, levofloxacin, ethionamide, and cycloserine. Due to the failure of sputum smear and culture conversion, we performed WGS on the isolates from these patients at Massey Genome Service, New Zealand as described previously [3]. It was found that both patients were infected with the strains resistant to both fluoroquinolones (codon D94A and D94H of gyrA gene) and aminoglycosides (codon A1401G of rrs gene), hence XDR-TB, but susceptible to bedaquiline and linezolid	Given WGS has been recently implicated in TB diagnosis in high-resource settings, and the sequencing costs are declining rapidly and fully automated analysis is increasingly available, the feasibility of incorporating WGS into drug-resistant TB management in low-resource settings should also be explored.	Clin Infect Dis (2017) 65 (3): 531-532.

20	Risk factors that may be driving the emergence of drug resistance in tuberculosis patients treated in Yangon, Myanmar.	Results indicate that a high proportion of patients (16%; 95% CI = 13-20) did not have a treatment supporter assigned to improve adherence to medication, with men being more likely to have no treatment supporter assigned. Use of private healthcare providers was very common; 59% (54-64) and 30.3% (25.9-35.0) of patients reported first seeking care at private clinics and pharmacies respectively. 8% (6-11) of tuberculosis patients had confirmed diabetes. 5% (3-8) stated that they miss taking tuberculosis medicines at least weekly, and patients with no knowledge of consequences of missing treatment were more likely to miss doses.	Findings indicate that ensuring that treatment adherence support for all patients, monitoring of response to treatment among the high proportion of tuberculosis patients with diabetes and engagement with private healthcare providers could be strategies addressed to reduce the risk of emergence of drug-resistant tuberculosis.	PLoS One. 2017 Jun 14;12(6):e0177999.
TB diagnosis				
21	Evaluation of a chest radiograph reading and recording system for tuberculosis in a HIV-positive cohort.	A set of 139 CXRs was reviewed by a group of eight physicians pre- and post-intervention at two clinics in Shan State, Myanmar, providing HIV/TB diagnosis and treatment services. Overall accuracy was similar pre- and post-intervention for most physicians with an average area under the receiver operating characteristic curve difference of 0.02 (95% confidence interval: -0.03, 0.07). The overall agreement among physicians was poor pre- and post-intervention (Fleiss $\kappa=0.35$ and $\kappa=0.29$ respectively).	This study demonstrated limited impact of the introduction of a CRRS on CXR accuracy and agreement amongst non-expert readers.	Clin Radiol. 2017 Jun;72(6):519.e1-519.e9.

Annex 3: TB Research Agenda Development Workshop (Time Table)

Venue: Hotel Thingaha, Nay Pyi Taw
Objectives

(1) To discuss and develop the agenda of priority TB research topics
(2) To strengthen the capacity of NTP personnel in identifying priority research topics

Time Table Day 1: Wednesday July 26, 2017

Time	Presentations	Presenters
8:30-9:00 am	Registration	
9:00-9:30 am	Opening remarks	Dr. U Myint Han, Director General, Ministry of Health and Sports
9:30-10:00 am	**Tea Break**	
10:00-10:20 am	TB Control situation in Myanmar, National Strategic Plan for TB control and operational challenges	Dr. Si Thu Aung, Program Manager, National Tuberculosis Programme
10:20-10:35 am	Summary of previous list of research priorities and achievement	Dr. Kyaw Thu Soe Research Officer, Department of Medical Research (DMR)
10:35-11:20 am	Operational/Implementation research: What, Why and how Group work procedures and expected outputs	Dr. Srinath Satyanarayana Deputy Director (Research), Center for Operational Research, International Union against Tuberculosis and Lung Disease (The Union)
11:20 -11:45 am	Questions &Answers (Clarification)	Dr. Si Thu Aung
11:45 am-12:15 pm	Group work (Introduction session)	All participants
12:15-1:00 pm	**Lunch**	
1:00- 2:30pm	Group work (Brainstorming session)	All participants
2:30-3:30 pm	Group Work (Prioritization session)	All participants
3:30- 3:45 pm	**Tea Break**	
3:45-5:45 pm	Group Work (Prioritization session) continued.	All participants

Time Table Day 2: Thursday July 27, 2017

Time	Presentations	Presenters
8:30-9:00 am	Recap of Day 1 activities	Dr. Si Thu Aung
9:00-10:00 am	Finalizing the group work	All participants
10:00-10:15 am	**Tea break**	
10:15 am - 12:15 pm	Presentation of priority research topics from each group (15 minutes presentation and 15 minutes discussion each)- Group Leader	Chaired by Dr. Si Thu Aung Dr. Kyaw Oo Deputy Director General (Department of Medical Services)
12:15-1:00 pm	**Lunch**	
1:00-2:30 pm	Group presentation continued	Chaired by Dr. Si Thu Aung Prof. Ko Ko Zaw Professor/Head (Dept of Epidemiology, University of Public Health)
2:30-3:15 pm	Group presentation continued	Chaired by Dr. Si Thu Aung Dr. Hla Hla Win Professor/Head (PSM, University of Medicine 1)
3:15 – 3:45 pm	Next steps and Closing Remarks	Dr. Si Thu Aung
3:45-4:00 pm	**Close of workshop & Tea Break**	

Annex 4: List of members in the thematic sub-groups

Name	Designation	Institution
Theme-1: Accelerated case finding		
Dr. Zaw Myint (Facilitator)	Senior Consultant (TB)	NTP, Yangon Branch
Dr. Saw Thein (Facilitator)	Deputy Regional Health Director (Admin &Budget)	Department of Medical Service
Dr. Ko Ko Htwe (Rapporteur)	Medical Officer	NTP
Dr. Sandar Aye (Rapporteur)	Project manager (ACF)	The Union
Dr. Aung Kaung Khant	Medical Officer	NTP
Dr. Aung Thu	National Technical Officer	WHO
Dr. Banyar Maung Maung	TB-HIV doctor	SMRU
Dr. Kyaw Zayar Lin		KDHW
Dr. Merdin M. Kyaw	Sr. consultant	KDHW
Dr. Nyein Nyein Aye	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Phyo Wai Thaung	Public Health Analyst	3MDG/UNOPS
Dr. Soe Htut Aung	Senior Technical Officer (M&E and Research)	Challenge TB/FHI 360
Dr. Tin Nwe Win	Program Manager	World Vision
Theme-2: TB/ DR-TB diagnosis		
Dr. San Mya (Facilitator)	Deputy Director (NHL)	Department of Medical Service
Dr. Tin Tin Mar (Facilitator)	Consultant Senior Microbiologist	Department of Public Health
Dr. Wah Wah Aung (Facilitator)	Director (Advanced Molecular Research Centre)	Department of Medical Research
Dr. Aye Su Mon (Rapporteur)	Research officer	Department of Medical Research
Dr. Kyi Kyi Swe (Rapporteur)	Medical Officer (Microbiologist)	Department of Public Health
Dr. Win Han Oo	Program Manager	Burnet
Dr. Wint Wint Nyunt	Senior Microbiologist	Department of Public Health
Mr. Aung Ko Min	National Technical Officer	WHO
Ms. Mi Mi Htwe	Research officer	Department of Medical Research
Ms. Su Hlaing Tint	Laboratory technical officer	Challenge TB/FHI 360
Prof. Ye Ye Naing	Professor/Head (Department of respiratory medicine)	Department of Medical Service

Theme-3: MDR-TB management		
Dr. Thandar Hmunn (Facilitator)	Medical Superintendent	Aung San TB Hospital
Dr. Moe Zaw (Facilitator)	Medical Superintendent	Patheingyi TB hospital
Dr. Aung Si Thu (Rapporteur)	Senior program coordinator	The Union
Dr. Kyu Kyu Thinn (Rapporteur)	Lecturer(PSM)	Department of Human Resource for Health
Dr. Aye Thida	National Technical Officer	WHO
Dr. Khay Mar Aung	Technical officer (MDR-TB)	Challenge TB/FHI 360
Dr. Moe Hnin Phyu	Medical Officer	Department of Public Health
Dr. Si Thu Aung	Program manager	Department of Public Health
Dr. Thida Yamin Pyone	HIV/TB Advisor	MSF-H
Dr. Tun Oo	Assistant Director (Admin)	Department of Public Health
Prof. Tint Tint Kyi	Professor/Head (Department of Internal Medicine)	Nay Pyi Taw1000 Bedded hospital
Theme-4: TB-HIV		
Dr. Myo Su Kyi (Facilitator)	Deputy Regional Public Health Director	Department of Public Health
Prof. Win May Thein (Facilitator)	Professor/Head (DTM)	Department of Human Resource for Health
Dr. Nang Thu Thu Kyaw (Rapporteur)	Senior Operational Research Fellow	The Union
Dr. Phyo Theingi (Rapporteur)	Medical Officer	Department of Public Health
Dr. Aung Yu Naing	National health coordinator	AHRN
Dr. Cho Lwin Oo	Program manager HIV/TB	Save the Children
Dr. Ei Ei Chaw	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Ni Ni Tun	Medical and operational director	MAM
Dr. Than Htike Aung	Medical Officer	NTP
Dr. Thwe Thwe Sein	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Win Le Shwe Sin Ei	Deputy Medical Coordinator	MSF-CH
Dr. Zaw Zaw Aung	Assistant Director	NAP
Theme-5: Public Private/ Public-Public Mix (PPM)		
Dr. Myat Kyaw Thu (Facilitator)	Assistant Director	Department of Public Health
Dr. Myat Myat Moe (Facilitator)	Assistant Director	Department of Public Health
Dr. Pyae Phyo Wai (Rapporteur)	Program Coordinator	The Union
Dr. Yadanar Aung (Rapporteur)	Research officer	Department of Medical Research

Dr. Hla Moe	Preventive and Social Medicine (PSM)	Department of Human Resource for Health
Dr. Htin Zaw Aung	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Khin Nan Lon	Deputy Regional Public Health Director	Department of Public Health
Dr. Nyan Lin	TB Program Manager	PSI
Dr. Phyu Phyu Swe	Deputy Director- TB	PSI
Dr. Sandi Tun	Program Manager	Pyi Gyi Khin
Dr. Thi Thi Win	M&E Manager	Pyi Gyi Khin
Dr. Thin Thin Yi	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Ye Htut Kyaw	Project Officer	MMA-PPM-TB
Dr. Zaw Lin Tun	senior Project Officer	MMA
Prof. Aye Aye Oo	Professor/Head(PSM)	Department of Human Resource for Health
Theme-6: Community engagement		
Dr. Cho Cho San (Facilitator)	Deputy Director	NTP
Dr. Htay Lwin (Facilitator)	District Public Health Director	Yangon
Prof. Hla Hla Win (Facilitator)	Professor/Head(PSM)	University of Medicine 1
Prof. Ye Tun (Facilitator)	Professor/Head (Department of respiratory medicine)	Department of Medical Service
Dr. Kyaw Thu Soe (Rapporteur)	Research officer	Department of Medical Research
Dr. Phone Suu Khaing (Rapporteur)	Project Manager	The Union
Dr. Aye Mar Lwin	Senior Program Officer	Challenge TB/FHI 360
Dr. Khaing Sandar Aung	Deputy State Public Health Director	Department of Public Health
Dr. Khine Nwe Han	Medical officer	MMFWA
Dr. Pyae Phyo Aung	Public Health Analyst, 3MDG/UNOPS	3MDG
Dr. Richard	Chest clinician	MAM
Dr. Su Thet Mon Thein	Medical officer	NTP
U Aung Khin	Secretary	MHAA
U Aung Shain	Vice President	MHAA
Theme-7: TB care in special populations (Children, elderly, migrant population, prisoners, DM)		
Dr. Kyaw Oo (Facilitator)	Deputy Director General	Department of Human Resource for Health
Dr. Thandar Thwin (Facilitator)	Senior Consultant (TB)	Department of Public Health

Dr. Tin Maung Swe (Facilitator)	District Public Health Director	Department of Public Health
Dr. Kyaw Ko Ko Htet (Rapporteur)	Research officer	Department of Medical Research
Dr. Khine Wut Yee Kyaw (Rapporteur)	Operational Research Fellow	The Union
Dr. Aung Kyaw Tun	Project local coordinator	Cesvi
Dr. Kyaw Swar Myint	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Moe Hein Kyaw	Technical officer (Prevention and Care)	Challenge TB/FHI 360
Dr. Nang Saung Kham	Team leader	Department of Public Health
Dr. Nay Wun Lynn	Deputy District Public Health Officer	NTP
Dr. Pan Myat Mon	Country Health Coordinator	Malteser
Dr. Sann Hla Phyu	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Than Lwin Htun	Regional Public Health Director	Department of Public Health
Dr. Thu Zar Myint Than	Project Manager	Cesvi
Theme-8: TB Epidemiology		
Dr. Ikushi Onozaki (Facilitator)	Medical Officer - TB	WHO
Dr. Tin Mi Mi Khaing (Facilitator)	Regional Officer (Retired)	Department of Public Health
Prof. Ko Ko Zaw (Facilitator)	Professor/Head(Department of Epidemiology)	Department of Human Resource for Health
Dr. Kyaw Lwin Show (Rapporteur)	Research officer	Department of Medical Research
Dr. Myo Minn Oo (Rapporteur)	Operational Research Fellow	The Union
Col. Dr. Myat Khine	Head	DSMRC
Dr. Aung Ko Oo	Program Associate PR- TB Team	UNOPS/GF
Dr. Khin San Tint	Country Director	CHAI
Dr. Khin Su Su Hlaing	M&E Advisor	Challenge TB/FHI 360
Dr. Kyaw Khaing	Public Health Analyst (TB)	UNOPS/GF
Dr. Ohmar Myint	Assistant Director (TB/Leprosy)	Department of Public Health
Dr. Swai Mon Oo	Research Manager	PSI
Prof. Toe Sanda	Professor/ Head(Department of Respiratory Medicine)	Department of Medical Service

Annex 5: List of background documents provided to the thematic sub-groups

Global Documents

1. Early detection of tuberculosis: An overview of approaches, guidelines and tools (WHO 2011)
2. Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries (WHO 2012)
3. Framework for the engagement of all healthcare providers in the management of drug resistant tuberculosis (WHO 2015)
4. Guidelines for treatment of drug-susceptible tuberculosis and patient care (WHO 2017 update)
5. The Shorter MDR-TB regimen (WHO 2016 factsheet)
6. Policy implementation package for new TB drug introduction (WHO 2014)
7. Equity, social determinants and public health programmes (WHO 2010)
8. Tuberculosis and diabetes (WHO 2016 factsheet)
9. Collaborative framework for care and control of Tuberculosis and Diabetes (WHO 2011)
10. Guideline: Nutritional care and support for patients with tuberculosis (WHO 2013)
11. Latent TB Infection (WHO 2015 factsheet)
12. TB prevention and control care in prisons: Chapter 8. (WHO/EURO)
13. Digital Health in the TB response (WHO 2015 factsheet)
14. Research for Tuberculosis elimination (WHO 2016 Factsheet)
15. Toolkit for Developing a National TB Research Plan (WHO 2016)
16. Global tuberculosis Report (WHO 2016)
17. WHO End TB Strategy
18. Ethics Guidance for the implementation of the End TB Strategy (WHO 2017)
19. Priorities for tuberculosis research (WHO/TDR 2013)
20. Framework for operations and implementation research in health and disease control programs
21. Priorities in Operational Research to improve Tuberculosis care and control (WHO 2011)
22. Operational Research in Childhood TB (WHO)

National Documents

1. National Strategic Plan (2016-2020)
2. National Strategic Plan Concise version
3. National Strategic Plan Operational Plan
4. National M&E plan (2016-2020)
5. National TB Spending assessment
6. National Tuberculosis Programme Annual Report (2015)
7. Guideline for the Management of TB-BHS manual (health care worker manual in Myanmar Language) (2016)
8. Guidelines for the Management of DR-TB in Myanmar (2017)
9. TB research priorities Workshop Report 2014
10. 2014 Myanmar STEPS Report
11. 2009-2010_TB_Prevelence_Survey_report
12. Annotated Bibliography of Research findings on Tuberculosis in Myanmar (2nd Ed, Studies from 2009 to 2014)
13. Childhood TB Guideline (2016) (Handbook)
14. Childhood TB Guideline (2016).
15. Third Drug resistant survey report
16. Mortality Survey report (2013)
17. SARA report

18. TB /HIV guideline
19. Community based TB care (Myanmar Language)
20. ACF guideline (Myanmar Language)
21. SCC guideline (Myanmar Language)
22. TB/DM (Myanmar Language)
23. Guideline for the Management of DR-TB-BHS manual (health care worker manual in Myanmar Language) (2017)
24. Standard operation procedure (SOP) for mobile team

Annex 6: List of topics line listed/ discussed by the thematic sub-groups during their group work on 26th July 2017

MDRTB

- Barriers to accessing diagnosis: of DR TB by gene Xpert from patient perspectives
- Barriers to receiving treatment in diagnosed MDRTB cases from patient perspectives
- Barriers to providing treatment in diagnosed MDRTB cases from provider perspectives
- Barriers to receiving treatment in diagnosed XDRTB cases from patient perspectives
- Barriers to providing treatment in diagnosed XDRTB cases from patient perspectives
- Health literacy on MDRTB among MDRTB patient
- Awareness and practices on IC measures for MDRTB among HCP in general hospitals
- Mortality analysis on MDRTB patients
- Risk factors for unfavourable outcomes of MDRTB patient
- Yield of TB/MDRTB cases among contacts of MDRTB patient
- Compliance with infection control measures in MDRTB patient at household level
- Burden and treatment outcome of MDRTB patient with co-morbid disease
- Survival analysis of MDRTB patient

TB-HIV

- Diagnosis and treatment initiation of TB and HIV including referral and feedback mechanism
- Acceptance and barriers to utilization of IPT by providers and patients
- Data quality and challenges in implementation of DHIS 2
- Quality of care for MDRTB and HIV among co-infected patients
- Infection control status at healthcare facilities
- Evaluation of TB/HIV collaborative activities before and after training
- Effectiveness of community based care for TB/HIV collaborative activities
- Barriers to implementation of HIV/TB coordination at all levels
- Outcomes and cost effectiveness of PLHIV received IPT for TB prevention
- Readiness of using electronic data management in district
- TB diagnosis delay and TB treatment initiation among PLHIV
- Frequency of TB screening among PLHIV, whether it is according to the guideline
- Barrier to receive ART among HIV/TB patients during TB treatment
- Overall treatment outcomes among HIV/TB patients
- Cause of death among HIV/TB patients
- HIV prevalence among diagnosed MDR-TB patients

Public-Private Mix

- Barriers to involve in TB control program by Private Hospitals (Not in partnership with MMA)
- Barriers to involve in TB control program by freelance GPs (Not in partnership with PSI/MMA)
- Cost effectiveness of various PPM models practised by Partner Organizations (PSI/MMA)
- Assessment of Data quality in recording and reporting system of TB cases referred by General Practitioners
- Factor influencing involvement of drug sellers in PPM activities
- Role and Involvement of Paediatricians in NTP to control over diagnose of Childhood TB
- Factor influencing the participation of GPs in National TB control activities
- Additional Case notifications by drug sellers to Project Townships

- Perspectives of Tuberculosis patients on family support and establishment of TB camp
- TB cases detected by informal drug vendors
- TB cases detected by traditional healers
- Factors influencing data recording and reporting system in Public-public mixed hospitals

Community Engagement

- Criteria of volunteer recruitment by local and international non-governmental organizations for community-based tuberculosis care
- Sustainability of volunteers without funding, and the role of multi sectoral organizations to contribute funding to provide community-based tuberculosis care
- Readiness of Integrated Community Malaria Volunteers to provide integrated health services
- Linkage between basic health staffs and community Volunteers
- Expectations from volunteers from their involvement in community-based tuberculosis care: Career development & Insurance?
- Knowledge, Attitude, and Practice of TB among community leaders
- Perception of Township health authorities on Community Based Tuberculosis Care
- Situational analysis of Community Support Models for TB control
- Practical and User-Friendly IEC materials for Community (Drug Sensitive and Drug Resistant TB)
- Overlapping of community-based tuberculosis care by different organizations in the communities (Why and How) (To be discussed in management and coordination meetings)
- Attrition rate and factors associated with their attrition among community volunteers recruited for community-based tuberculosis care
- Effectiveness of community-based tuberculosis care provided by volunteers
- Self-help groups (SHG): Do they work in TB care services? Their perception, performance, and expectations.
- Multi-sectoral engagement in community-based tuberculosis care. What are they? How will they contribute?
- Integration of existing community-based charity organizations in TB control activities

Accelerated Case Finding

- Barriers to accessing CXR diagnosis for TB: provider and user perspectives
- Occurrence of TB among household contacts of bacteriologically confirmed index TB cases and barriers of implementation of contact investigation in selected townships
- Patient-centered care (ACF mobile team)
- Perception on mobile team activity by attendees and their community
- Finding the missing cases through innovative school-based TB case finding activity
- factors influencing the performance of SCC in selected townships
- factors influencing the performance of community volunteers in TB case finding
- Prevalence of TB among TB health care providers
- Situational analysis of TB IC in TB laboratory?
- Initial loss and treatment outcomes of TB patients diagnosed from ACF mobile team (urban)
- KAPB of TB in ethnic groups residing in hard-to-reach area
- Assessment of the integrated community malaria volunteer approach in TB case finding (2019)
- Situational analysis of microscopy (fluorescent) facility at all townships including station health units
- Pilot intervention of fluorescent microscopy centre at station health units to assess the feasibility

- Contribution of different health care providers in community based TB case finding: A study from patient's perspective
- Feasibility of basic health staffs (BHS) to conduct contact investigation? Analysis of the effectiveness (CNR before & after, prevalence, incidence) of each ACF interventions by different implementing partners? (rationale – ACF contribution shows an increasing trend from 2012-2016 but CNR does not increase)
- Trend of CNR in selected state and region after 3 years of ACF mobile team visit
- Doses the yield of contact investigation of household contacts of bacteriologically confirmed index TB cases low in the current situation?

TB/DR-TB Diagnosis (Laboratory)

- Usefulness of GXP on stool samples and gastric lavage from childhood TB cases
- PZA drug susceptibility pattern among the Rifampicin resistant patients using both genotypic and phenotypic tools
- Effectiveness, quality and cost effectiveness of center of excellence (COE) for TB diagnostic and management at the District level
- Barriers and enablers for sustainability of microscopy centers in EQA participation and factors contributing to the quality of microscopy centers
- Surveillance of TB cases by the national clinical specimen banking system in NTRL
- Detection of viability of AFB by using FDA (fluorescein diacetate)
- The value of TST in BCG vaccinated under 5 children for TB screening
- Effectiveness of mobile case finding using GXP Omni and routine GXP
- Prevalence of NTM using LPA in smear(+), GXP (-) cases
- Comparative study of GXP and urinary LAM for diagnosis of TB among the HIV patients

TB care in special population

- What are the clients and provider's barriers to providing IPT in under 5 children of positive index cases?
- Outcomes of IPT treated children
- Childhood TB diagnosis by pediatricians and other health workers notified in NTP.
- Diagnosis consistency of childhood TB with NTP guideline where high childhood TB proportion was reported (more than 20%).
- Presence of BCG scar among notified childhood TB cases disaggregated by types of TB.
- Correlation of TST positive and cervical lymph node enlargement in presumptive lymph node TB cases
- Growth parameter monitoring the improvement after anti-TB treatment completion and factors associated with changes in growth parameter after anti-TB treatment
- Contact investigation among source cases investigation among notified under 5 years-old childhood TB cases.
- Catastrophic cost of childhood TB cases
- Assessment of health seeking behaviours in migrant
- Assessment of health seeking behaviours miners
- KAP among miners, mine owners
- KAP among prisoners and prison staffs
- Bi-directional screening of TB among DM patients and DM among TB patients and assessment of referral pathway
- Evaluation of referral system between TB clinic and DM clinic one year after implementation of TB DM collaborative activities
- Role of family members in early diagnosis of TB in elderly population

- Assessment of infection control in prison
- Assessment of infection control and TB prevalence in healthcare workers in Township health centers.
- Cost effectiveness of screening algorithm of ACF risk group
- Perception and acceptance of BHS on TB care
- Readiness and feasibility assessment of sample collection centers in the hard-to-reach area.
- Evaluation of annual CXR screening to health care providers and reasons of not screening
- Designing locally applicable strategy for TB prevention and control in Ethnic Health Organization

TB epidemiology

- How can we identify missing cases (How can we know patients treated in private sector? Surveillance-number is corrected or not?)
- Social determinants of country/people that affect transmission (people who don't have access, treated but not notified may be by the private sector, people who have access but not treated) (how we can make to notify the cases?)
- Can we use volunteers to find the missing cases (gaps)?
- Gap between incidence and notification in private sector, mobile population, conflicted and remote areas
- Quality of TB diagnosis
- TB in workplace like gold mines (mobile population in remote workplaces) (there is no baseline information) – feasibility (Policy gap, stigma gap)
- How to develop TB surveillance system in private practitioners/private hospitals? (TB cases will miss out if private hospitals do not notify the cases to NTP)
- Perception of TB in workplace among factory in-charge, employees and family members (Qualitative,)
- Model development of one-stop TB service at public hospitals
- Assessment of sustainability of drug sellers in notifying TB cases
- Assessment of infection control practice of TB/MDR-TB patients and their family members
- Prevalence and resistance patterns of MDR-TB among migrant populations (18 from 2014)
- Zero TB meningitis in children might be good indicator as zero TB cases is difficult
- Model development of active surveillance system of childhood TB meningitis in children's hospitals
- Factors influencing the accessibility of IPT among children with latent TB infection (TST + in children)
- Follow up of TB cases and family members according to 2009-2010 nationwide TB prevalence survey
- Follow up of TB cases and family members according to 2017-2018 nationwide TB prevalence survey: Cohort study
- TB death audit of MDR-TB
- Media Campaign on TB testing and diagnosis among bus drivers

Annex 7: Summary of plenary discussions held on 27th July 2017 on the top priority topics

Plenary started at 10:15am and was chaired by Dr. Kyaw Oo (Deputy Director General, Medical Services) and Dr. Si Thu Aung (NTP manager) for the morning session.
Dr. Kyaw Oo kicked off the group presentation by explaining about the time allotment for each group presentation and discussion. He also highlighted the importance of implementation/operation research in program implementation. He shared the information on the grant awarded by the Ministry of Health and Sports which is available for implementation/operational research at DMR and deadline to submit the proposal is 30 August 2017.
The medium of interaction during the group presentation and discussion was Myanmar language and simultaneous translation to English was projected on the separate screen for the non-Myanmar.
The following facts are discussed during group presentation by the audience:

MDR-TB (presented by Dr. Moe Zaw from TB Hospital)

Research question (RQ)1: Situational analysis of the treatment in diagnosed pre-XDR/XDR patients.

RQ2: Analysis on unfavourable outcomes of MDR-TB patients.

RQ3: Barriers to receiving treatment in diagnosed MDR/RR-TB cases

RQ4: Awareness and practices on infection control measures for MDRTB among HCP in general hospitals

RQ5: Factors associated with the occurrence of TB/MDRTB cases among contacts of MDR-TB patients. For this topic, there was a suggestion that the study designed should be cross sectional comparative. Dr. Kyaw Ko Ko Htet suggested to consider the strain of the bacteria because the result of the yield of TB will depend on the strain of the MDR-TB of index cases.

A participant from MHAA suggested including a topic on basic health staff and MDR-TB (the role of BHS 2 in disease control program which will contribute ATM which can meet the SDG.) and role of health education in MDR-TB control in addition to the above five priority topics. He also highlighted that health education is an art and plays an important role in the control of TB in Myanmar.
The group responded that they discuss the topic on basic health staff during the group work, but the topic did not become one of the priority topics.
Dr. Ko Ko Zaw said that the HR/BHS is not only an issue for MDR-TB, it is also for all health issues. So it should be discussed as an overall issue in health system research later.
In addition, one of the participants highlighted on health literacy of MDR-TB patients might be an important area to look at.
Dr. Si Thu Aung finally suggested to combine the RQ 1 and 3 and included a topic on health literacy.
The group agreed to add the health literacy topic to the top 5 priorities.

HIV/TB (presented by Dr. Myo Su Kyi from Department of Public Health)

RQ1: Diagnosis and treatment initiation of TB and HIV including referral and feedback mechanism. Dr. Onozaki said that the NTP already achieved more than the target to provide ART and TB treatment among HIV/TB patients in reality. The group mentioned that only 58% of registered HIV-positive TB patients received ART in 2016 which was reported in NTP annual report. He said that it was a reporting weakness and it is a WHO responsibility to create a reporting system to capture the real situation, as well as strong collaboration

between NAP and NTP, is needed. Dr. Si Thu Aung said that this topic is useful to inform the program. He suggests using quarterly reports which can be combined and analyzed as a cohort study.

RQ2: Acceptance and barriers to utilization of isoniazid preventive therapy (IPT) by providers and patients. One of the participants suggested to use the term “treatment of latent TB infection” in place of “IPT”.

RQ3: Data quality and challenges in the implementation of DHIS 2. Dr. Si Thu Aung shared his concern on this topic because the DHIS 2 has been implemented recently and it will not be easy to analyze the quality. Therefore, he suggested to move this topic to a low priority. The group responded that they will consider to move to less priority topic but would like to keep one topic related to e-health.
One member of the audience shared that the current implementation of e-health has a lot of challenges and errors.
The chair agreed that it can be a research question to know what the challenges of implementing e-health are.
A participant from CHAI (current implementer of e-health) asked why we want to emphasize only DHIS 2. He said that there are other electronic health recording system and it can be a good study to conduct in the next 5 years but not in the next one or two years.
Dr. Onozaki clarified that e-health was not only important for HIV/TB but also for overall public health practice. As e-health is a cross-cutting issue, there is difficult to get sufficient votes for this to be a priority. Dr. Si Thu Aung finally agreed to keep this topic, since it is useful to know how to apply this tool in TB care as a 5th priority topic.

RQ4: Quality of care for MDRTB and HIV among co-infected patients. Dr. Khin San Tint from CHAI proposed to use open MRS which can capture clinical information of MDR-TB patients who are HIV coinfected for this data. The data collection that might be useful for this study can be available in 2019 and it will be good to analyse this as a cohort study. Dr. Si Thu Aung suggested that this topic should be combined with topic from other domains.

RQ 5: Infection control status at healthcare facilities. One of the audience shared his experience that the real challenge is to implement the guideline and he hoped that after knowing the problem, there should be a mechanism to intervene. A participant shared that the Wash survey will be conducted in three levels of hospitals, which can be linked with this topic/study. Dr. Si Thu Aung suggested to combine this topic with RQ 4 from the MDR-TB domain.

One of the participants asked whether the group have considered treatment outcome of TB/HIV co-infected patients as a priority topic because it was already reported that mortality rate among TB/HIV patients was 16%.
The group responded that the topic is in the 17 initial RQ but the study was already done by Dr. Phyo Theingi and therefore, it wasn’t in the top 5 priority list.

Finally, Dr. Si Thu Aung said that HIV/TB is an area which receives special attention by the deputy director of disease control. He agreed that MDR-TB/HIV treatment information should incorporate regular data collection systems, and advised to combine RQ 3 and RQ 4.

Public-Public/ Public Private Mix (presented by Dr. Nyan Linn from PSI)

RQ 1: Barriers to involvement in TB control program by freelance GPs (Not in partnership with PSI/MMA) and partnership GPs in selected Townships. Dr. Kyaw Ko Ko Htet suggested to add caseload and geo-social mapping which can help to get background information for other research questions of this domain. Dr. STA reminded that topics should be chosen depending on the feasibility to conduct in collaboration with NTP. He said that the feasibility to conduct the RQ1 is in question as there is a need for a technical assistance.

RQ 2: Factors influencing involvement of registered drug sellers in TB control activities
RQ 3: Role of unregistered drug vendors in TB case detection in selected townships. Dr. Kyaw Thu Soe suggested to include the population in the research question. He also suggested to combine RQ 2 & 3 (registered and unregistered drug sellers). The group replied and convinced that they are different issues so it should be two separate research questions.
One of the participants suggested that they should do qualitative study first for the "Role of unregistered drug vendors in TB case detection in selected townships" if there is no background information.
Dr. Si Thu Aung said that it will be difficult to study unregistered drug sellers.
Group responded that while the researchers from their group did the mapping of register drug seller, they also met un-register drug sellers and plan to do health education and there could be possible to conduct this study.
Dr. Aung Thu backed up the group that it's possible to trace/reach unregister drug seller, like HIV program reach to commercial sex workers. He also shared how to identify research methodology. Some groups mentioned study design and data collection methods which at least need to be able to answer the research question.
Dr. Ko Ko Zaw said that study on unregister drug seller is very relevant topic although methodologically difficult. He will support in developing method if needed.

RQ 4: Assessment of data quality in recording and reporting system of TB cases managed under PPM projects.
RQ 5: Factors influencing treatment outcomes in PPM clinics and hospitals.

Afternoon session was chaired by Dr. Si Thu Aung and Dr. Ko Ko Zaw

Community engagement (presented by Dr. Phone Su Khaing from The Union)

RQ 1: Sustainability of Community Based TB care after 2020. Dr. Si Thu Aung said this topic is broad although the topic is important as sustainably is an important issue. He shared that the Global Fund is not sure to continue funding after 2020 and currently, the GF proposals are under discussion at Geneva. He said that there is a possibility of GF being allowed to use savings and, there will be the possibility to continue activities. The group responded that although the topic is vague, the CBO originations are dependent on the donors and want to know how to fundraise through multisector supports. There is a need to explore how CBOs can generate funding by multi sectorial approaches after 2020 when the donor support reduces. Dr. Si Thu Aung agreed but suggested to move RQ 1 to less priority topic.

RQ 2: Feasibility of expanding Self Help Group in TB services. Dr. Si Thu Aung asked to check whether the RQ is overlapped with the study done by World vision.

RQ 3: Readiness in the provision of integrated health services by Community Malaria Volunteer. Dr. Si Thu Aung said that the training of malaria volunteers (Integrate ATM) is ongoing, so the RQ is relevant. Dr. Win

Han Oo from Burnet shared that they already planned a study on "Feasibility and community acceptance of malaria volunteers in community health care".
RQ 4: Integration of existing community-based organizations (CBOs) in TB control activities. Dr. Si Thu Aung advised that it is important to collaborate with NTP from the implementation phase. He also said that there are CBOs working in TB control activities, but there is no report to NTP. The group clarified that this topic is to study the TB related activities done by the existing CBO's (especially Charity organizations).
The RQ is relevant in this phase and useful to NTP and he suggested to change the topic to "Integration of existing CBO in current TB care".

RQ 5: Practical linkage system between BHS and Volunteers in TB Control activities. Dr. Zaw Myint shared his experience that the volunteers are important in referring presumptive TB patients to mobile chest X-ray clinic and there were 400 X-rays done in his recent visit to the township in one day with a mobile clinic because there were MSI & The Union volunteers in this township.

Finally, Dr. Ko Ko Zaw said that community engagement and PPM area are difficult areas to conduct a study that will have an impact on program policy and practice. It was suggested to seek technical assistance and collaborate with expert/organizations.

Accelerated case finding (presented by Dr. Ko Ko Htwe from NTP)

RQ 1: Situational analysis of CXR facility. Dr. Ko Ko Zaw suggested to clarify whether this is to assess the barriers to accessing CXR diagnosis for TB from provider and user perspectives or whether this looks at the countywide or regional level. The Group clarified that they are planning to assess at township level because the national cumulative data is already available but the quality and source of the data need to be assessed. The Group also added that the research question aims to assess the functioning of those facilities such as whether there is any X-ray facility or not. If there is, they will assess whether the health care providers are using it or not and if CXR is done, whether there is anyone to read the X-ray or able to send to another facility (specialist) to read X-ray. Dr. Hla Hla Win gave the opinion that the research question is not a researchable question and this issue can be solved by proper program management rather than conducting research. Dr. Ko Ko Zaw suggested to expand the RQ.

RQ 2: Occurrence of TB among household contacts of bacteriologically confirmed index TB cases and barriers of implementation of contact investigation (CT) in selected townships. Dr. Myo Su Kyi mentioned that yield of TB from contact investigation/tracing is already known from the study done by The Union. Therefore, the current question needs to be expanded. Dr. Moe Zaw said that the leprosy is under control due to good CT so CT is an important part of the TB control. He suggested carrying out an intervention (training to volunteer or create a model of CT and recording and reporting system) and compare the result. He also said that there are some issues that need to be strengthened by the program and may not need to conduct a study. The group responded that there are gaps in the data available to analyse contacts tracing activities. This research aims to study the current implementing CT activities and the yield of TB among the index case and agreed to modify the research question.

RQ 3: Assessment of sputum collection center (SCC).
RQ 4: Patient-centered care (ACF mobile team) perception on mobile team activity by attendees and their community.
RQ 5: Finding of missing TB cases through School-based ACF.

Dr. Si Thu Aung suggested to do a nationwide survey for RQ 1, 2 and 3 as the guideline for CT is in the process of developing and a pilot study can be done after the implementation of the guideline.

TB/DR-TB Diagnosis including laboratory diagnosis (presented by Dr. Wint Wint Nyunt from NTRL)

RQ 1: Sensitivity of GXP on gastric lavage and stool samples from childhood TB cases. The chairperson said that there was a study done by a public health master student which showed that there was a low culture positive in GXP cases in gastric lavage. He also advised to consider what will be the gold standard test to assess the sensitivity and the clinical outcome can probably be used as a gold standard to confirm TB diagnosis. The group clarified that the proposed research is planned to compare with the gold standard test. Dr. Tin Mi Mi Khaing raised the question in comparison sampling whether the study aims to compare the gastric lavage and stool result. The group clarified that they intended to test for PTB and also mentioned that in terms of feasibility, the stool is more favourable for testing as it is easy to get a sample and the sensitivity is not very different. Prof Ko Ko Zaw shared his concern on using the clinical outcome as the gold standard. He said that if the gastric lavage is negative and if clinical features are consistent with TB, anti TB treatment is provided and if there is a response, TB diagnosis was usually confirmed in real clinical practice. With regards to this topic, Dr. Aye Thida asked what will be the minimal CFU (colony forming unit) for detectable in GXP in the stool. Dr. Wint Wint Nyunt responded that it is not recommended to do GXP on a Stool sample and no data is available for CFU for stool. One of the participants mentioned that there are many issues in methodology. Hence, he suggested that usefulness of stool sample in the diagnosis of TB in children and comparing the result from gastric lavage should be reconsidered. The Chairperson also suggested to reconsider the title as the sample (both Gastric lavage and stool) can be sent both for culture and GXP. He believed that it will be difficult to study sensitivity as it is difficult to determine the gold standard. If there is no gold standard test to compare, only positivity can be reported.

RQ 2: PZA drug susceptibility pattern among the Rifampicin resistant patients using both genotypic and phenotypic tools. The chairperson said that this topic is important as the PZA is now included in the shorter regimen.

RQ 3: Effectiveness, quality and cost effectiveness of center of excellence (COE) for TB diagnostic and management at the District level. Dr. Si Thu Aung said the topic is not clear and the group clarified that they proposed to compare the COE model with the existing model and also cost effectiveness of the model will be calculated.

RQ 4: Barriers and enablers for sustainability of microscopy centers in EQA participation and factors contributing to the quality of microscopy centers. The Chairperson pointed out that there will be bias in sampling as only existing EQA centres will be included. He suggested that some centres are not included in EQA and they should be assessed if they are not included continuously and factors will be explored by the qualitative study.

RQ 5: Surveillance of TB cases by the national clinical specimen banking system in NTRL.

TB care in special population (presented by Dr. Sann Hla Phyu from NTP)

RQ 1. Bi-directional screening of TB and DM and assessment of referral pathway. Chairperson suggested to clearly define the referral pathway. He also suggested to think whether it is already set up and what is the dropout rate. The reason for drop-out should also be studied. He also suggested the evaluation of referral pathway should be done only after implementing of TB DM activities.

RQ 2. Designing locally applicable strategy for TB prevention and control in Ethnic Health Organization. Chairperson requested to clarify what special regions are proposed to conduct the proposed research. As different ethnic group are living in that region and we don't know the applicability of current practice in that region. The new strategy cannot be created at once. He said that we need to assess current activity first and belief, language barriers could be barriers to current activity. It is needed to rephrase the title to be more appropriate. Applicability and barriers to current TB control activity should be explored and it is better to recommend in that study to create a new strategy. One of the participants suggested that IEC materials can be printed in local language, but the transportation cost is high in this area and it is not covered by standard cost used in other region and states. Hence, there is a need to modify the title and research question.

RQ 3. Barriers to provide IPT in under 5-year old children of positive index cases. One of the participants from NTP mentioned that this is an important programmatic issue and the NTP has been discussing with paediatrician and it is still challenging to implement and also recording and reporting is a barrier. To conduct this study, it is suggested to think of site selection to implement this project.

RQ 4. Assessment of health seeking behaviors to TB in migrants: Peri- urban and cross border areas
Dr. Aye Thida suggested that qualitative study is difficult to implement and to review some existing study on an ethnic minority. It is suggested to do a quantitative study based on findings from previous studies. Chairperson suggested to conduct the study in collaboration with SMRU. Migrants are not only in Border area and migrants are living in the whole country of Myanmar. It is needed to specify the study area to implement this research project. The group replied that the study area will be specified and it could be different among different area. In Yangon, there are many migrants in Industries. Chairperson suggested to do separate study for peri-urban migrant and cross border migrant.

RQ 4. Readiness and feasibility assessment of sputum collection centres in Naga area. The chairperson said that if we want to calculate the cost effectiveness, we need to consider all cost (direct and indirect). In addition, if we get only the yield of TB data, it might be difficult to study cost-effectiveness. In some regions (ethnic minority), there is a high cost of implementing SCC and the question is that whether we should spend that amount of money and whether the approach yield will be a high number of TB cases. He advised to collaborate with a health economist for this topic. He said that MAM is implementing the project in this area and suggested to collaborate with MAM. Dr. Aye Thida said there is some overlap in the SCC topic and suggested to consider to combine two SCC topics. The group members agreed to combine.

Finally, Dr. Si Thu Aung mentioned that TB/DM is new area to emphasize and it is in line with NSP. Thirty townships were selected as pilot to implement and now developing SOP to implement. This could be an implementation study and we cannot do all townships so far. He said he would update current condition on TB/DM in Myanmar. He also mentioned that the strategy to identify TB in DM patients need to be considered. Symptom screening cannot be efficient. One directional SOP already existed and bi-direction screening has to be updated. Not only symptom screening was done to DM patients, but other investigations will also be done and it is already implemented in tertiary hospitals.

TB epidemiology (presented by Dr. Swe Mon Oo from PSI)

RQ 1: Follow up on communities of nationwide 2017-2018 TB prevalence survey. The chairperson questioned whether the proposed study is "Post survey which is already planned and it is not included in current study.

Dr. Onozaki clarified that the proposed study will be broader to include community level. (Community impact) which will be different than the survey which was planned.

RQ 2: Active surveillance system of childhood TB meningitis in children's hospitals. Dr. Si Thu Aung said that TB meningitis surveillance is already included in Routine surveillance. TB meningitis is related to EPI coverage (BCG) and EPI coverage would be the topic that he is interested to know.

Dr. Tin Mi Mi Khaing responded that the proposed RQ is to study the confirmed TB cases among meningitis cases with the diagnosis confirmation for each meningitis case needs to be collected. She suggested that from this Active surveillance, factors can be explored. Dr. Hla Hla Win said that it is impossible to find TB meningitis cases in the community and probably we can look for early case of TB meningitis in community? If we survey patients admitted to hospital, it is not active surveillance. It is just confirmation, which is different.

The group clarified that the initial idea is that BHS will go to patients' home and investigate source of infection which we added in this research topic but was not mention in this presentation.
Ongoing cases, TB meningitis in HIV positive and GXP done (CSF sample).

RQ 3: Prevalence and resistance patterns of MDR-TB among migrant populations. The group suggested to add "Selected townships" to the topic. 6 months of study period is too short and they suggest to extend it to 12 months.

RQ. 4: Pilot/Feasibility study on TB surveillance system in private hospitals. It is suggested that there are 7 private hospitals implemented by MMA and this topic can be implemented in collaboration with MMA.

RQ 5: Early TB case detection and perception of TB among workers of transportation services in Yangon Region. It is suggested that the air-conditioned bus in Yangon and their drivers, TB in workplace (start from most dangerous and risky place) and other transportation worker in Yangon region (not only bus, also taxi and train staff, boat) need to be included in this study. But the chairperson said it could be difficult to say there would be an early detection of TB from this study. He also suggested to specify types of transportation and he prefers to start with YBS in Yangon.
Dr. Onozaki explained that the key aspect of this OR topic is the entrance to or conduct a pilot study of TB in workplace in general to seek how TB prevention and care including active case detection can be implemented in workplace. However, as an OR it is correct to start the activity from high-risk as well as danger groups (whose TB affect others more). However, seeking the prevalence of TB among those transportation workers was not a primary purpose at all. The primary purpose was to know how to conduct, and feasibility and acceptance for future expansion of the TB care and prevention in workplace since so many men are missing TB diagnosis in general health service.
The group clarified that CXR will be used as screening tools.

Finally, the program manager requested the groups to consider to revise the topic and prioritize according to the discussion during the group presentation session and send/contact to core group member within 1 week. He closed the plenary of the group presentation.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