REVIEW OF THE
NATIONAL TUBERCULOSIS PROGRAMME

World Health Organization

Myanmar, 7-15 November 2011

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TABLE OF CONTENTS

TABLE & FIGURES

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ABBREVIATIONS

3DF	Three Diseases Fund
ACSM	Advocacy, communication and social mobilization
AHRN	Asian Harm Reduction Network
AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
ASEAN	Association of South-East Asian Nations (including Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam)
AusAID	Australian Agency for International Development
BHS	Basic Health Staff
CPT	co-trimoxazole preventive therapy
DFID	United Kingdom Department for International Development
DMR	Department of Medical Research
DOT	Directly observed treatment
DOTS	basic package that underpins the Stop TB strategy, consisting of five elements: political commitment with increased and sustained financing; case detection through quality-assured bacteriology; standardized treatment with supervision and patient support; effective drug supply system and management; and monitoring and evaluation system with impact measurement
DRS	Drug resistance survey
DST	Drug susceptibility testing
EQA	External quality assurance
EXPAND-TB	Expanding Access to New Diagnostics for TB (project funded by UNITAID and implemented by Global Laboratory Initiative, FIND, WHO and GDF)
FIND	Foundation for Innovative New Diagnostics
GAVI	Global Alliance for Vaccines and Immunizations
GDF	Global Drug Facility
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GP	General Practitioner
HIV	Human immunodeficiency virus
HR	Human resources
HRD	Human resource development
IDU	injecting drug user
IEC	information, education, communication
IFRC	International Federation of Red Cross and Red Crescent Societies
IHC	Integrated health care
IOM	International Organization for Migration
IPT	Isoniazid preventive therapy
JATA	Japan Anti-Tuberculosis Association
JICA	Japan International Cooperation Agency
KAP	Knowledge, attitude and practices
LPA	Line probe assay

M-CCM	Myanmar Country Coordination Mechanism
MCH	Maternal and child health
MDG	Millennium Development Goal
MDR-TB	Multidrug-resistant tuberculosis
MHAA	Myanmar Health Assistant Association
MMA	Myanmar Medical Association
MMCWA	Myanmar Maternal and Child Welfare Association
MOH	Ministry of Health
MRCS	Myanmar Red Cross Society
MSF	Médecins Sans Frontières
MWAF	Myanmar Women's Affairs Federation
NAP	National AIDS Programme
NGO	Nongovernmental organization
NTP	National Tuberculosis Programme
NTRL	National TB Reference Laboratory
PAS	Para-amino-salicylic acid
PLHA	People living with HIV/AIDS
PMTCT	Prevention of mother-to-child transmission
PPM	Public–private or public–public Mix
PSI	Population Services International
RBRC	Random blinded rechecking
RHC	Rural Health Centre
RIT	Research Institute of Tuberculosis
SEA	South-East Asia
STD	sexually transmitted disease
STI	sexually transmitted infection
TB	Tuberculosis
TB TSG	TB Technical and Strategic Group
TMO	Township Medical Officer
TOT	Training of Trainers
TST	Tuberculin skin test
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
Union	International Union Against Tuberculosis and Lung Disease
UNITAID	international facility for the purchase of drugs and laboratory commodities for HIV/AIDS, malaria and tuberculosis
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VCCT	Voluntary Confidential Counselling and Testing for HIV infection
WFP	United Nations World Food Programme
WHO	World Health Organization
Xpert MTB/RIF	Rapid TB and MDR-TB diagnostic test based on nucleic acid amplification test
XDR-TB	Extensively drug-resistant tuberculosis

EXECUTIVE SUMMARY

Myanmar is one of the world's 22 high tuberculosis (TB) burden countries, and supporting TB control in Myanmar is a global priority. This report reflects the findings, discussions, conclusions and recommendations of the fourth international review mission of the Myanmar National TB Programme (NTP), which brought together international and national partners to review progress in TB control and to offer guidance on future TB control directions and efforts.

Achievements

Since the last review in 2007, the NTP has examined more than 1.2 million persons for TB, diagnosed and treated over 630 000 patients, and saved 100 000 lives, and the prevalence of smear-positive TB with chronic cough has fallen by one third since 1994. The NTP has ensured an uninterrupted supply of quality-assured anti-TB drugs at all levels, and delivered uninterrupted TB services despite periods of resource instability, with exceptional technical and financial support from its partners, particularly the Three Diseases Fund (3DF). The quality of programme management, monitoring, supervision and existing services is notable. Paediatric treatment is available nationwide. Extensive training has yielded integration of TB diagnostic and treatment services through Basic Health Staff (BHS) in all townships. In line with the global Stop TB Strategy, the NTP has engaged private providers at a nationwide scale through partnerships with the Myanmar Medical Association (MMA) and the Sun Quality Health network, which together now account for 15% of TB case finding nationally. Pilots for TB/HIV collaboration and multidrug resistant TB (MDR-TB) services have established the model for the NTP to scale up these crucial services.

Challenges

A high-quality national disease prevalence survey completed in 2010 demonstrated a TB disease burden two to three times higher than anticipated on the basis of previous surveys. In 2011 about 200 000 adults and children will have developed TB, including 20 000 HIV infected and 9000 suffering from MDR-TB, both of which will require additional care and costly treatment. TB remains among the top killers of adults, and more women die of TB than from maternal causes.

These findings are challenging, but they point the way forward. The intensity of existing NTP efforts will require redoubling, with special attention to filling vacancies in programme staff at all levels. New activities will be required to reach those persons who currently do not access primary health care, demanding a significant mobilization of additional resources from both domestic and international sources, increased procurement of commodities, and searching for increased efficiency and cost savings. The current national strategic plan, based on the prior belief of a lower TB burden, budgets US$ 30 million per year, with a US$ 18 million gap for 2012.

MAIN RECOMMENDATIONS

A. Recommendations to the Ministry of Health

Health development is entering a resource-constrained period of unknown duration. This represents a serious risk for TB control in Myanmar given the high proportion of financial support that comes from external sources. The review therefore makes the following recommendations:

A1. Ensure the prominence of TB control in the National Health Development Plan, commensurate with TB's position as a major contributor to morbidity and mortality.

A2. Given the key role of the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) in external financial support, it is imperative to ensure that the Phase 2 assessment of the Round 9 grant achieves an "A" grading and that the Round 11 grant application is approved (note: just after this review was completed, the Global Fund announced that Round 11 was cancelled).

A3. Consider significantly increasing the government's financial contribution to national TB control beyond the US$ 650 000 budgeted for 2012 by filling vacant positions and additionally supporting supervision, monitoring and anti-TB drugs for all townships.

A4. Energetically pursue all potential funding sources, taking full advantage of their renewed interest in Myanmar. Explore collaboration with the proposed expansion of maternal and child health (MCH) care in Myanmar to ensure that diagnosis and treatment is available for pregnant women and young mothers, and to expand care for TB-affected children. Pursue all available funding sources for new diagnostic tests and second-line drug treatment and management of MDR-TB, including UNITAID and the United States Agency for International Development (USAID).

A5. Further encourage productive partnerships between ministry departments involved in TB care, most notably the National AIDS Programme (NAP) and the Maternal and Child Care Programmes.

B. Recommendations to the National Tuberculosis Programme

The NTP should urgently focus on increased case finding as the first priority, using different strategies to detect cases earlier and in greater numbers, while evaluating the effects by operational research.

B1. In all areas case detection should be immediately strengthened, including through:

- systematic contact investigation
- involvement of additional formal and informal care providers
- expanding eligibility for sputum examinations to a broader range of symptoms beyond chronic cough and finding of any undiagnosed abnormality in the lung fields on chest X-ray
- increased access to culture and new, rapid diagnostic technologies, such as Xpert MTB/RIF
- an intensified information campaign for the general public, aimed at mobilizing communities and diagnosing cases earlier.

B2. In areas with limited access to services, additional case finding measures should be rapidly

introduced. In urban areas with high TB prevalence, urgently introduce a special case finding programme making increased use of chest X-ray as a screening tool.

B3. Take full advantage of the unique and successful collaboration the NTP has already with the private sector and expand such approaches to cover the whole country and scale-up linkages with hospital specialists.

B4. Expand TB/HIV collaborative activities to all townships, starting with making HIV test kits available for routine testing of TB patients.

B5. Detect MDR-TB earlier, deploy rapid diagnostics and improve laboratory capacity as detailed in the National Plan for MDR-TB scale-up. Urgently secure second-line anti-TB drugs to meet the current and projected shortfall for MDR-TB treatment, commensurate with availability of resources.

B6. Ensure availability of anti-TB drugs only through a prescription from an authorized practitioner.

B7. Continue to improve management capacity and efficiency at national, state/regional, district and township levels.

C. Recommendations to World Health Organization (WHO) and partners

C1. Continue to provide technical and strategic assistance to the NTP for the implementation of the National Strategic Plan 2011-2015, focusing on the main priorities listed above.

C2. Ensure coordination and the use of NTP control policies by all partners through the TB Technical and Strategic Group.

C3. Promote better coordination between the national TB and AIDS control programmes.

C4. Support the development of strategic plans including budgets for increased TB case-finding and collaborative TB/HIV activities during early 2012. These plans, as well as the existing MDR-TB scale-up plan, should form part of the National Strategic Plan 2011-2015.

C5. Prioritize reaching the technical and financial targets of the Global Fund Round 9 grant for smooth transitioning to the second phase of the grant in January 2013 and with no or minimal reduction in Phase 2 budget.

C6. Ensure close collaboration with all current and potential donors, including the private sector, to decrease the considerable funding gap.

C7. Support increased efficiency and cost savings by further improving coordination with all partners and by ensuring synergies with other disease control programmes and with the Global Alliance for Vaccines and Immunizaitons (GAVI) Health System Strengthening and Maternal and Child Care Programmes, particularly with regard to human resources, infrastructure and access to primary health care services all over the country.

C8. Ensure that the country benefits from new developments including introduction of new tools for diagnosis and treatment.

C9. Continue to provide technical assistance to epidemiological surveys and operational research, taking advantage of the excellent capacity of the NTP for catalysing change in national but also international TB policy development.

INTRODUCTION

The last review of the Myanmar NTP was conducted from 22 January to 2 February 2007. In view of the considerable achievements by the programme during the last few years, the newer approaches adopted by the programme in line with the expanded Stop TB Strategy since 2007, and also the challenges lying ahead, the Government of Myanmar requested that WHO conduct a review of the NTP. This was the fourth review since the introduction of the DOTS programme.

Terms of reference

The aim of the review was to offer guidance on the design, implementation and sustainability of the NTP, within the government's overall health plans. The team could review the results of the more recent efforts on the burden of TB in the country, including those supported through bilateral and international initiatives, and discuss the future actions needed to reach the TB-related Millennium Development Goals (MDGs).

The terms of reference of this fourth review were to:

- Assess the progress in implementing the Stop TB Strategy and in reaching the TB-related MDGs;
- Review the national TB prevention and control strategy, analyse challenges and opportunities and advise on priority areas and actions for the NTP up to 2015;
- Identify actions to be pursued by NTP and its implementing partners with a focus on sustainability of the programme;
- Create enhanced advocacy for increased commitment for TB control at all levels.

Methodology

The review took place with the full support of the Ministry of Health (MOH). Technical assistance was provided by WHO with the cooperation of international and national reviewers. National reviewers included programme staff (government and partners) as well as non-programme staff working in other MOH sections. The international reviewers were experts in TB control or public health (Annex 1).

The first day consisted of a briefing on TB control in Myanmar by the NTP and technical and financial partners. The review team also finalized the strategy for collecting evidence. The review included four separate field visits to a number of sites across the country, including a special assignment as part of the annual monitoring mission by the Global Drug Facility (GDF). The sites visited were pre-selected and assigned to the teams as follows:

Team I Yangon Region

Team II Bago Region, Mon and Kayin States

Team III Nay Pyi Taw, Sagaing and Mandalay Regions

Team IV Shan State (South)

The teams could observe delivery of the NTP as well as partner services and talk to policy-makers, health managers, medical officers, health workers, private physicians, TB patients and members of the community. Back from the field sites, the team rapporteurs presented the findings of the field visit during a plenary meeting of the reviewers. An international expert was assigned as focal point for each technical component of TB control (e.g. laboratory, MDR-TB, childhood TB) and prepared a draft conclusion and recommendation for his/her area, which was then discussed in plenary. A consensus was reached among all reviewers on the key findings, conclusions and recommendations. These were presented during separate debriefing meetings with the Minister for Health, the Myanmar Country Coordination Mechanism (M-CCM), and donors and partners. The programme of the review and meetings held on 7 and 15 November is to be found in Annex 2 and the list of participants at meetings and persons met during the field visits is given in Annex 3.

BACKGROUND

Geographic, demographic and socioeconomic features

Myanmar covers an area of 676 578 sq km and shares land borders with Bangladesh, China, India, Lao People's Democratic Republic and Thailand. Administratively, the country is divided into 14 regions and states[1] consisting of 67 districts, 330 townships, 64 subtownships, 2891 wards, 13 698 village tracts and 64 817 villages.

According to the Government of Myanmar, the population in 2009-2010 was estimated at 59.13 million with a growth rate of 1.3%. (The United Nations [UN] estimates the population to 50 million). About 70% of the population reside in rural areas, while the remainder are urban dwellers. The population density for the whole country is 86 per sq km and ranges from 15 to 666 per sq. km. Myanmar is made up of 135 distinct races speaking over 100 languages and dialects. The mainstream population consists of Bamar people while the major ethnic groups are Kachin, Kayah, Kayin, Chin, Mon, Rakhine and Shan. About 89% of the population are Buddhists. The rest are Christians, Muslims, Hindus and animists.

Myanmar is classified as a low-income country by the World Bank. For the Human Development Index 2011 which measures health, education and income, Myanmar ranks 149 out of 187 countries with data.

1 The administrative division in areas with a Bamar majority is called Regions while areas dominated by ethnic/tribal populations are called States. Regions and States belong to the same tier in the administrative set-up.

Overview of health situation

Table 1 summarizes the overall health statistics for Myanmar (information from WHO's Global Health Observatory).

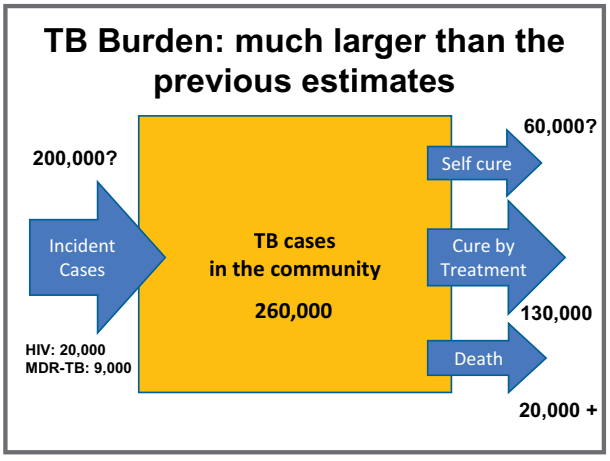
Table 1. Basic health indicators, 2009

Health financing	
General government expenditure on health as a percentage of total government expenditure	1%
Total expenditure on health as a percentage of gross domestic product	2%
Private expenditure on health as a percentage of total expenditure on health	90.3%
Per capita total expenditure on health at average exchange rate (US$)	12
Human resources	
Physicians per 10 000 population	5
Number of physicians	17 791
Nurses per 10 000 population	8
Number of nursing and midwifery personnel	49 341
Selected indicators	
Life expectancy at birth (years)	64
Under-five mortality rate (per 1000 live births)	71
Maternal mortality ratio (per 100 000 live births)	240
Prevalence of HIV per 1000 adults (15-49 years)	6
Number of malaria cases (confirmed + probable)	591 492

TB EPIDEMIOLOGY

A nationwide TB prevalence survey was conducted in 2009-2010. This survey revealed that the prevalence of TB in Myanmar is two to three times higher than previously estimated (the previous estimate was based on the 1994 prevalence survey results and an annual risk of infection estimate of around 1.5%). After adjusting for children (who were not surveyed), the observed prevalence of smear-positive TB was 171 (131-223) per 100 000 population and that of bacteriologically positive TB 434 (355-529) per 100 000 population. The previous WHO estimate for all TB cases was 169 per 100 000, two to three times lower than the observed prevalence of bacteriologically positive TB. When TB in children, extra-pulmonary TB and bacteriologically negative TB are taken into consideration, the TB prevalence (all cases) could be 600 or more per 100 000 population. WHO has therefore revised the 2009 point estimate of prevalence for all TB cases to 598 per 100 000 population, corresponding to an absolute number of 260 000 or more cases.

Figure 1. Number of TB cases found in the community in Myanmar, including influx and outflow of cases estimated per year



States showed a significantly higher prevalence than regions, which may be related to access to TB services. The TB prevalence was also higher in urban areas (especially Yangon) than rural ones, although more patients were notified and treated from urban areas. The combination of a high prevalence (240 per 100 000 for smear-positive cases) and a high notification rate (150 per 100 000) in Yangon points to a significant incidence and ongoing transmission. The prevalence among males was more than twice that in females, as is also observed in neighbouring countries.

Most prevalent TB cases in the community do not present with the classical TB screening criteria by symptoms or do not report any symptom at all. The current NTP definition of TB suspects by cough for two or three weeks can detect only one third of smear-positive and one fifth of culture-positive TB cases.

The prevalence survey was not designed to measure incidence. While many other factors determine incidence apart from a pool of open cases, a similar increase in incidence should not be assumed. The incidence of all TB cases was estimated to be 384 (328-445) per 100 000 population. The overall incidence remained fairly stable over the past years, with no real decrease but also no increase. This is in spite of a significant rise in HIV during the last ten years. Any possible increase due to HIV may have been offset by successful programme interventions.

The prevalence of HIV among TB patients has been informed by sentinel surveillance conducted serially, starting in four sites in 2005, growing to 20 sites by 2010. The 2010 data shows a range of HIV seroprevalence of 0.7%-27.9%, with an average of 10.4%.

Two nationwide drug resistance surveys (DRS) have been carried out in Myanmar. The first, conducted in 2002-2003, showed an MDR-TB rate of 4% among new cases and 15.5% among previously treated cases. The second survey, carried out in 2007-2008, showed that the proportion of MDR-TB among new cases was 4.2% and among previously treated cases 10.0%. The MDR-TB rate among new cases is the highest in the South-East Asia Region (SEA) and points to a significant transmission of drug-resistant strains. It is estimated that more than 9,000 MDR-TB cases emerge on an annual basis in Myanmar. During 2007-2008,

drug susceptibility testing for second-line drugs on isolates from 86 Category II failure cases showed that 85 had MDR-TB and one had XDR-TB. During 2009 and 2010, second-line drug susceptibility testing was available for another 187 MDR-TB cases (all Category II failures). These data showed that no second-line drug resistance was observed in 79.1% of cases, and that 2.1% of cases had XDR-TB. In addition, 8% of cases were resistant to ofloxacin, 5.9% were resistant to kanamycin, 1.1% were resistant to cycloserine, 4.3% were resistant to ethionamide, 7.0% were resistant to para-amino-salicylic acid (PAS) and 3.7% were resistant to capreomycin. A third nation-wide drug resistance survey is planned for 2012.

Mortality due to TB was also revised upward. It is now estimated to be 41 (25-64) per 100 000 population. This new estimate does not reflect an increasing trend but rather the adjustment in absolute number of deaths that must occur with the revised disease burden.

The WHO 2011 Country Profile which was based on the revised estimates following the results of the prevalence surveys shows significant declining trends for mortality and prevalence. Compared to the 1990 (revised) estimates as baseline, a reduction with 50% of mortality will be achieved in 2015 while it may be within reach for prevalence. The incidence estimates hovers below 400 per 100 000 population.

STRUCTURE AND ORGANIZATION OF HEALTH SERVICES AND NATIONAL TB PROGRAMME

General health services

The Ministry of Health is the lead government agency responsible for improving the health status of the people of Myanmar by providing a conducive environment for rendering comprehensive promotive, preventive, curative and rehabilitative health services. The MOH is headed by a Minister, who is assisted by the two Deputy Ministers. The ministry has seven departments, each headed by a Director-General: Health Planning, Health, Medical Science, Medical Research (Lower Myanmar), Medical Research (Central Myanmar), Medical Research (Upper Myanmar) and Traditional Medicine. The Department of Health is responsible for providing health-care services to the entire population of the country. There are three Deputy Directors-General and 11 Directors in charge of the following divisions: Administration, Planning, Public Health, Medical Care, Disease Control, Epidemiology, Health Education, Food and Drug Administration, Laboratory, Occupational Health and Nursing.

The Regional/State Health Department is responsible for regional-/state-level planning, coordination, training, technical support, supervision, monitoring and evaluation of health services.

The Township Health Department, headed by the Township Medical Officer, forms the backbone for primary and secondary health care. Each township covers, on average, a population of 173 000 people. Each township has a hospital with 16, 25 or 50 beds, one or two station hospitals and four to seven rural health centres (RHCs) as well as urban health centres. Each RHC has four subcentres staffed by a midwife and a public health supervisor. In addition there are voluntary health workers (community health workers and auxiliary midwifes) in outreach villages.

Referral services are available to specialized or tertiary hospitals located in major cities. There are seven medical universities (including defence service, nursing and public health).

While MOH is the major provider of health services in Myanmar, health services are also provided by other public as well as private health-care providers. Some other ministries (e.g. Defence, Railways, Mines, Industry, etc.) also render health services. In line with the national health policy, local and international nongovernmental organizations also provide health-care services.

National Tuberculosis Programme

The NTP is led by a Programme Manager with the rank of Deputy Director, who reports to the Director (Disease Control). At central level, she is assisted by four Assistant Directors (against one sanctioned post) for the following areas: MDR-TB and TB/HIV; procurement and supplies management; PPM; and monitoring and evaluation. The National Tuberculosis Reference Laboratory (NTRL) is headed by a Senior Consultant Microbiologist. There are TB Officers and Microbiologists for both Upper and Lower Myanmar, based in Mandalay and Yangon, respectively. Vertical TB staff are also present in seven states and seven regions. All regions and states also have a TB laboratory. At the more peripheral level, TB control is fully integrated.

Out of 67 districts, 47 have a dedicated TB team. Of the remaining 263 townships, 54 have a TB team. The NTP has trained at least three persons in each township, including the Township Medical Officer. The NTP has 1028 staff with 30 additional posts created to strengthen TB control activities at state/regional and district level, though a significant proportion (32%) of these posts remain vacant.

Township hospitals function as DOTS diagnostic and treatment units. TB registers are maintained at this level. Township general or TB laboratories perform sputum microscopy. This service is also available in Township

hospitals function as DOTS diagnostic and treatment units. TB registers are maintained at this level. Township general or TB laboratories perform sputum microscopy. This service is also available in all general hospitals at state/regional level and all specialist hospitals in Yangon and Mandalay. Culture and drug susceptibility testing (DST) services are centralized in Yangon and Mandalay only. NGO and private laboratories have also been linked to the NTP and are included in the overall external quality assurance (EQA) network.

With support of 3DF followed by the Global Fund, WHO has created a network of consultants based at state/regional level as well as in the reference laboratories who provide additional support and make important contributions in supervision, training and monitoring activities. A fund-flow mechanism, common for the three diseases, was also set up by WHO for channelling 3DF funds and by the Principal Recipient for channelling Global Fund funds.

PROGRAMME MANAGEMENT, FINANCING AND RESOURCE MOBILIZATION

The NTP collaborates with a number of national and international health and development agencies to implement the Stop TB Strategy. To ensure best use of comparative advantages and to avoid fragmentation and duplication of efforts, regular coordination meetings are held under the TB Technical and Strategic Group (TB TSG), which is coordinated by the Department of Health with WHO serving as the secretariat. The role of the TB TSG is to assist in the overall TB programme implementation and in the monitoring and evaluation of the national strategic plan. The TB TSG reports to the M-CCM which oversees and coordinates the national response relevant to HIV/AIDS, TB and malaria but also to maternal, newborn and child health, and other related health issues, thus well beyond the activities funded by the Global Fund which it was initially designed to undertake. The M-CCM ensures collaboration of all partners and funding agencies. Table 2 shows the contribution to TB control of locally present organizations in Myanmar. Figures 2 and 3 show the geographical distribution of the work by townships of MMA, Population Services International (PSI) and other international partners, respectively.

Table 2. Health and development agencies supporting TB control in Myanmar

Organization	TB control activities	Location of TB control activities as of 2011
Asian Harm Reduction Network (AHRN)	• TB/HIV • Harm reduction	Kachin State Shan State (North)
International Organization for Migration (IOM)	• Community involvement • Advocacy, communication and social mobilization (ACSM)	Ayeyarwaddy Region Mon State
Japan Anti-Tuberculosis Association (JATA) Japan International Cooperation Agency (JICA)	• DOTS • Operational research • Public–Private or Public–Public Mix (PPM) • Laboratory strengthening • Training	Mandalay Region Yangon Region
Malteser International	• DOTS • TB/HIV • ACSM • Community involvement	Rakhine State
Médecins du Monde	• TB/HIV	Kachin State Yangon Region

Médecins Sans Frontières -Holland	• MDR-TB • TB/HIV	Kachin State Rakhine State Shan State (North) Yangon Region
Médecins Sans Frontières - Switzerland	• MDR-TB • TB/HIV	Tanintharyi Region Yangon Region
Merlin	• DOTS • ACSM	Ayeyarwaddy Region Sagaing Region
Myanmar Medical Association (MMA)	• PPM • ACSM	116 townships
Myanmar Health Assistant Association (MHAA)	• DOTS • ACSM	Mandalay Region
Myanmar Women's Affairs Federation (MWAF)	• DOTS • ACSM	Ayeyarwaddy Region Shan State (East)
Myanmar Maternal and Child Welfare Association (MMCWA)	• DOTS • ACSM	Mon State Bago Region
Myanmar Red Cross Society (MRCS)	• DOTS • ACSM • Community involvement	Mandalay Region Yangon Region
Pact Myanmar	• DOTS • ACSM	Magway Region Sagaing Region
Populations Services International (PSI)	• PPM • ACSM	194 townships
Union	• TB/HIV	Magway Region Mandalay Region Sagaing Region Shan State (North and South) Yangon Region
World Health Organization (WHO)	• All elements of the Stop TB Strategy	Country-wide
World Vision (WV)	• DOTS • ACSM	Tanintharyi Region Kayah State Yangon Region Mon State

Figure 2. **PSI and MMA programme coverage, 2011**

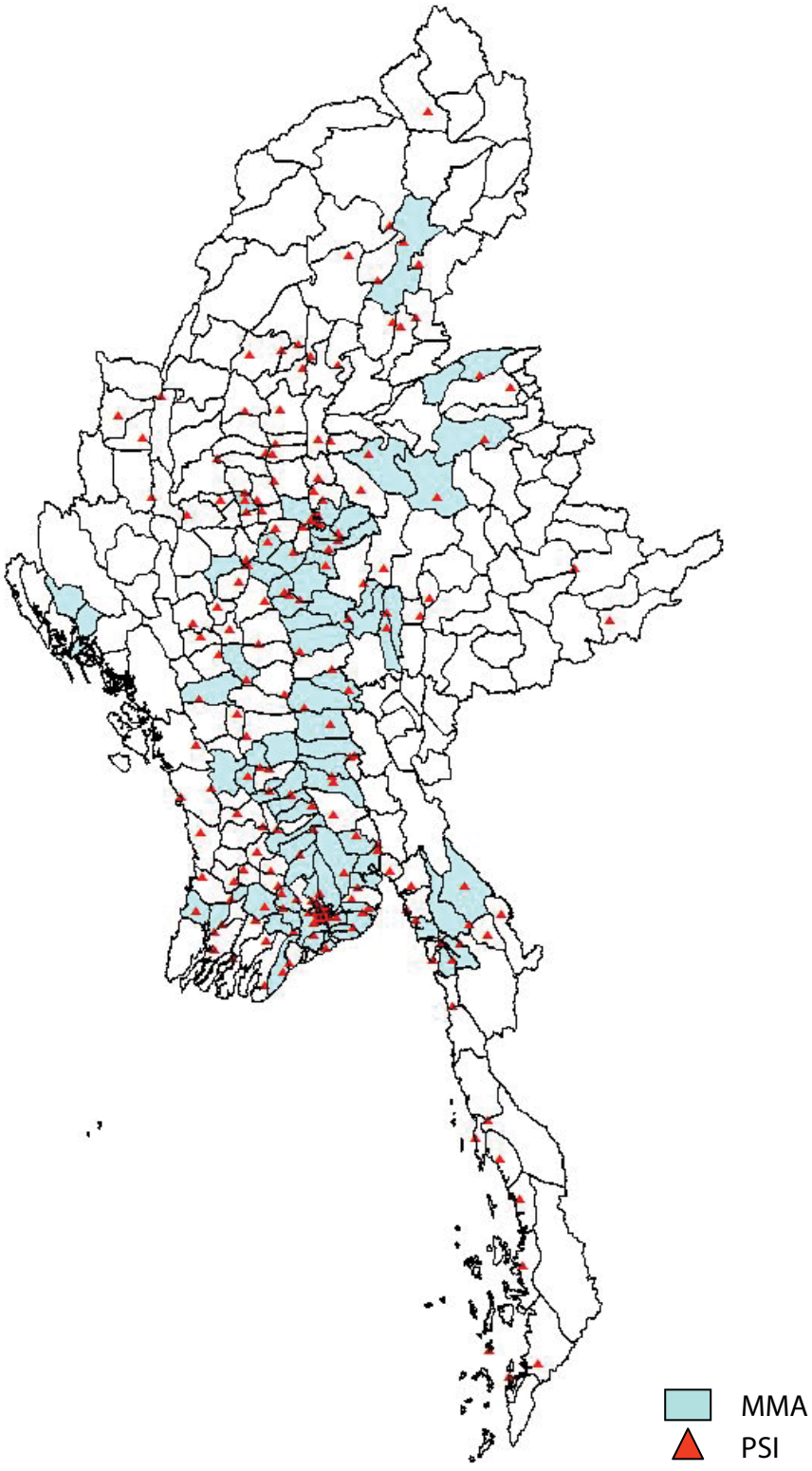
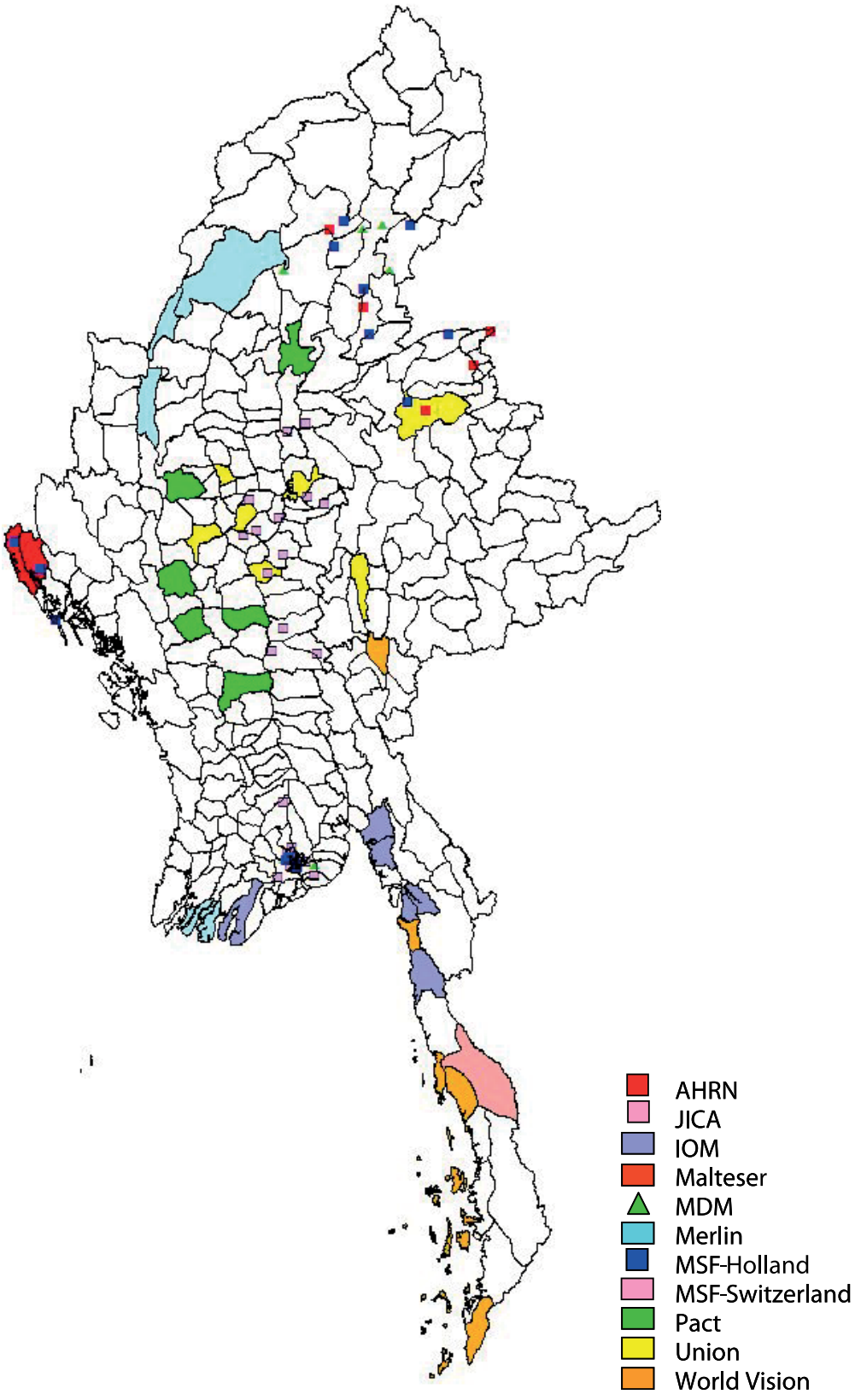


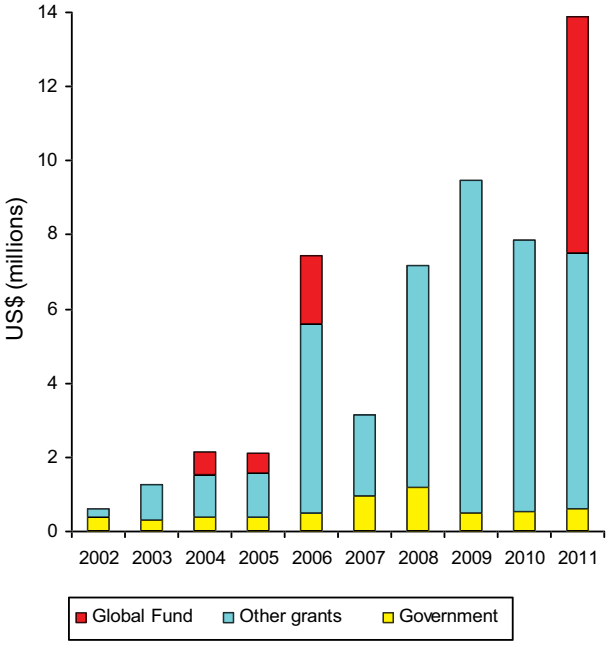
Figure 3. **International partner programme coverage, 2011**



TB control financing

In 2011 the NTP's budget was US$ 14 million compared to US$ 600 000 in 2002 (Figure 4). In 2011, the government contributed US$ 595 000 to TB control, equivalent to 4% of the available budget. A major contributor to the success of the NTP has been the GDF, which supported anti-TB drugs for Myanmar for seven years from 2002-2009.

Figure 4. Funding available for the National TB Programme, 2002-2011



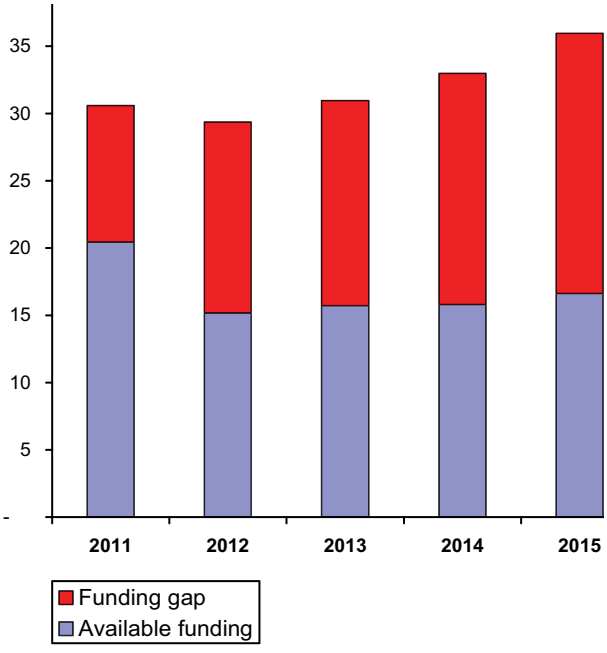
In 2004, a US$ 100 million Global Fund grant for TB, HIV and malaria started. However, in late 2005, the Global Fund withdrew its support. About a year later, in October 2006, 3DF was launched. This is a donor consortium by the European Commission and Governments of Australia, Denmark, the Netherlands, Norway, Sweden and the United Kingdom. From 2006 to 2011, US$ 113 million was provided by 3DF to HIV, malaria, TB and integrated projects, of which US$ 17 million (15%) was for TB. WHO managed 68% of the 3DF TB control funds and channelled them to the NTP and MMA.

In 2011, Global Fund support was reinitiated and the implementation of a Round 9 grant started for the three diseases. If implemented smoothly, the Global Fund will provide US$ 65 million for TB control until the end of 2015, which represents about 76% of the overall funding currently estimated for TB control in the country.

Other important financial partners include UNITAID, supporting second-line anti-TB drugs, paediatric TB drugs and the EXPAND-TB project that has ensured full renovation of the two national reference laboratories. Bilateral support is provided by USAID and the Japan International Cooperation Agency (JICA). In May 2011, TBREACH, an initiative funded by the Canadian International Development Agency for increased TB case detection, announced that three organizations (PSI, IOM and the International Union Against Tuberculosis and Lung Disease [the Union]) had been granted US$ 2.5 million for one year. Collaboration is also ensured by the corporate sector, and Total/Yadana Consortium is supporting the Union with US$ 800 000 per year.

The total costs for TB control from 2011 to 2015 have been calculated at US$ 160 million. However, the funding requirements were developed prior to the results of the prevalence survey, thus with a significantly underestimated TB burden. In addition the MDR-TB scale-up was set at a low pace. Based on the inaccurate funding requirements, the funding gap from 2011-2015 is estimated to be US$ 10-19 million per year (figure 5).

Figure 5. Funding requirements, availability and gaps, 2011-2015



It should be stressed that TB control, including first- and second-line anti-TB drugs, will be totally dependent on the Global Fund from 2012 onwards (about 80%-82% of currently estimated funding needs will come from the Global Fund from 2012 to 2015). Revisions are therefore needed to the funding requirements, especially adding activities needed to 1) accelerate TB case finding, 2) scale up TB/HIV collaborative activities, and 3) ensure treatment, diagnosis and care of MDR-TB patients (five-year plan already developed with a budget of US$ 56 million).

Collaboration with financial partners is crucial to fill the budget gaps. The first draft of a proposal to Global Fund Round 11 was completed; shortly after this review, however, the Global Fund Board announced the cancellation of Round 11. While the government will need to increase its support to TB control, efforts should be made to increase or assure continued support from UNITAID, TBREACH, bilateral and multilateral agencies and the private sector.

As a result of the return of the Global Fund to Myanmar, 3DF will change its scope of work and will in the future become the Three MDG Fund. It has been announced that US$ 250 million is available from the Three MDG Fund for the next five years. Although the bulk of funds will support MCH activities, about 20% of the funds will support TB, HIV and malaria. Synergies should also be explored with the GAVI health system strengthening support which is meant to focusing on service delivery, programme coordination and human resources in hard to reach areas.

FINDINGS AND RECOMMENDATIONS ON TB CONTROL AREAS

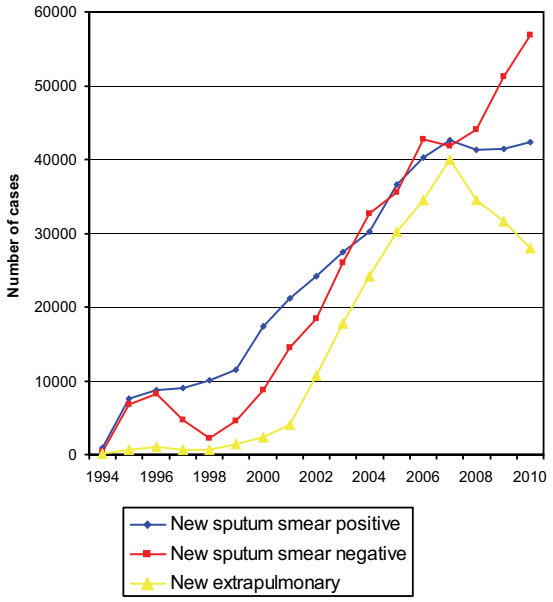
1. Case detection

Achievement

Myanmar notified 131 590 new and relapse TB cases to WHO in 2010. The notification rate of 274 per 100 000 population is the second highest in Association of South-East Asian Nations (ASEAN) countries after Cambodia (286 per 100 000) as well as in the WHO SEA Region after Timor-Leste (432 per 100 000). In 2010, the case notification rate of new smear-positive cases was 86 per 100 000 population. As the notification rate of smear-positive was 37 per 100 000 population in 2000, efforts to expand DOTS have led the case detection to increase by more than 100% in the last decade.

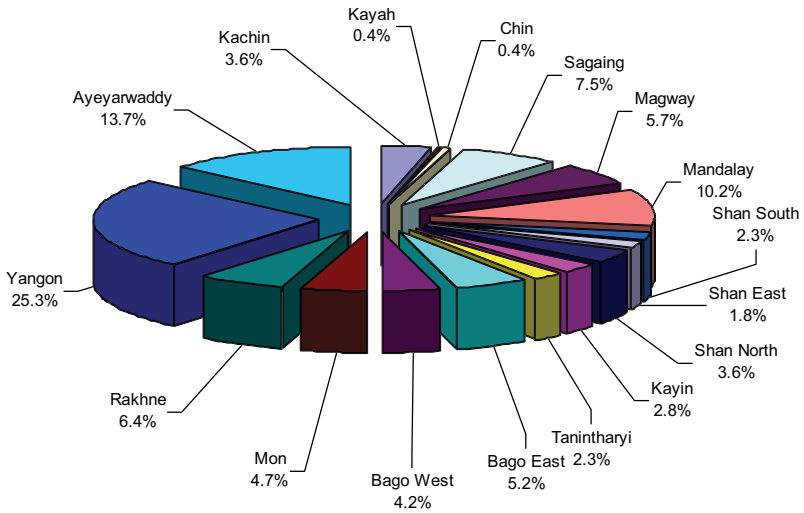
Among 137 403 notified cases in 2010, 127 134 cases were new and 10 269 cases were retreatment cases. Among the 127 134 new cases, 33% were smear-positive, 45% were smear-negative and 22% were extra-pulmonary (Figure 6). Although children aged less than 15 years occupied only 0.7% of new smear-positive cases (302/42 318), they occupied 23.6% of all notified cases (32 471/137 403). However, paediatricians reported massive reduction of TB meningitis among young children, most probably due to high BCG coverage.

Figure 6. Number of new smear-positive, smear-negative and extrapulmonary TB cases notified, 1994-2010



A significant variation in case notification was recorded. The rate of new smear-positive cases varied from 24 per 100 000 population in Chin State and 43

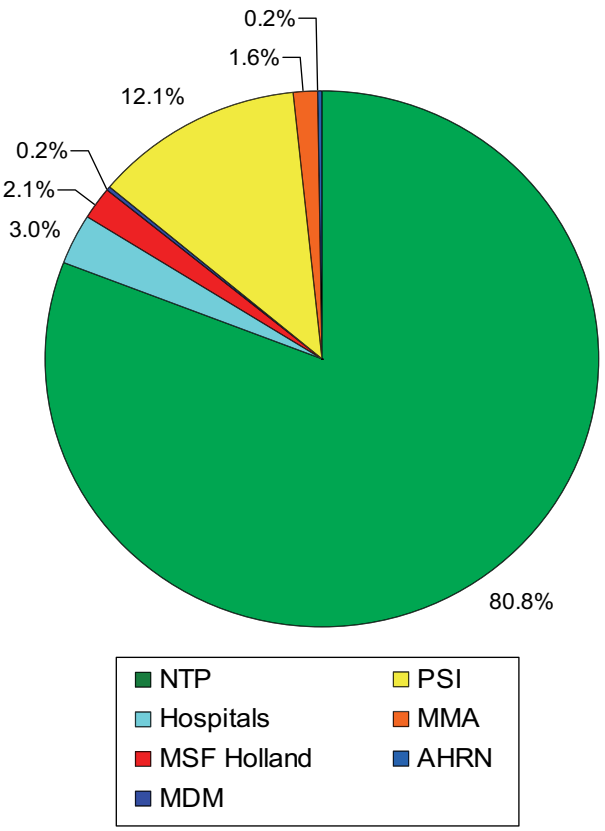
Figure 7. Proportion of smear-positive TB cases in each region/state, 2010



per 100 000 population in Kayah State to 83 per 100 000 population in Kachin State and 140 per 100 000 population in Yangon in 2010. Figure 7 shows the distribution of TB cases per state/region in 2010.

The NTP's efforts to expand quality TB care service with partners are acknowledged. Coverage by PPM widened to cover all states and regions (19.2% of notified cases in 2010) (Figure 8).

Figure 8. TB notifications by the NTP and partners, 2010



The smear-positivity rate among TB suspects was 19% with no recent change after the significant decline by mid-2000. Yangon, where access is better than other places, recorded a positive rate of 22%. Early use of chest X-ray before suspecting TB in Yangon seems to be a bias (30%+ TB suspects visiting TB centres have already had a chest X-ray in the private sector). Except for remote areas where chest X-ray is not available, most TB patients had a chest X-ray at some stage in their TB diagnosis, including in the private sector.

TB screening among all patients during admission to hospital is a good practice in general hospitals, but triage of patients with cough and fever is not routinely practised in most outpatient departments except TB clinics. Excellent practice was observed in each site visited to feed back the surveillance data to townships to strengthen the programme. Efforts to standardize practice were recognized. The International Standard of TB Care was introduced in 2009 and childhood TB guidelines were released in 2007.

Challenges

Despite the great achievements listed above, the 2009-2010 prevalence survey identified the following gaps in case detection:

- High prevalence and low notification in states, and high notification and high prevalence in urban areas;
- Smear-positive patients often do not report typical chronic cough, though most have other symptoms;
- Smear-positive cases represent only 40% (123/311) of bacteriologically positive cases;
- Higher prevalence (2871/100 000) of bacteriologically positive TB in previously treated TB patients;
- TB patients stay in the community, either neglecting their symptoms or seeking self-care rather than visiting medical services. When they visit medical service they tend to visit the informal sector or pharmacy as a first act rather than a doctor. When they decide to see a doctor, they visit private general practitioners before public facilities.

The number of new smear-positive case seems to have reached a plateau in 2007 (42 588 in 2007 and 42 318 in 2010), accompanied by a similar trend of number of smear examinations. This suggests the limitation of current strategies to recruit and diagnose smear-positive cases. The survey results showed that the NTP and partners were successful in removing smear-positive TB cases with chronic cough efficiently in most places where access to diagnostic service is established. However such cases are just one part (15%) of prevalent bacteriologically-positive TB cases in the community. A countrywide project of community involvement to enhance case detection of symptomatic smear-

positive TB in the late 2000s seems to have had a very limited epidemiological impact.

Relapse cases are often diagnosed without bacteriological evidence. Although the guidelines were released in 2008, practices to diagnose children were not well documented. There is no rationale to set a case detection target or calculate a case detection rate in each region/state or township based on a national incidence estimate since the TB epidemiology varies greatly according to geographical area.

Recommendations

Accelerating case detection should be the top priority in TB control and care in Myanmar, while sustaining the high treatment success rate. Based on evidence from the TB prevalence surveys, operational research and follow-up evaluation, the following approaches should be applied. In order to fill the detected gaps in Myanmar, the case-finding approach should be broadened beyond WHO's general recommendations to countries:

1.1. Messages to the general public should be amended to further raise general awareness of TB and encourage appropriate actions to get early diagnosis. It should be emphasized that chronic cough is not the only sign of TB.

1.2. Eligibility for sputum examinations should be widened beyond chronic cough, and all health-care workers should be notified to conduct examinations in the case of e.g. any chronic symptom and illness, cough less than two weeks with any other illness, or any undiagnosed abnormality in chest X-ray.

1.3. Chest X-ray should be recognized as a highly sensitive TB screening tool. Its early application should be endorsed so as not to miss cases.

1.4. Contact tracing should be systematically implemented not only for smear-positive cases as an index case but also other cases, such as child TB, to identify a source case.

1.5. Instructions to TB patients who have completed treatment should be standardized so as not to miss future relapse cases. Materials such as an ex-patient card should be developed. Diagnosis of "relapse" should be done more carefully based on bacteriology.

1.6. Routine case detection in states should be strengthened. In addition special measures such as provider-initiated TB screening (e.g. an intensified approach to those who visit the hospital with a complaint other than chronic cough) and introduction of mobile diagnostic facility (active case detection in limited-access areas) should be introduced.

1.7. A special programme should be developed for congested urban areas, particularly Yangon, to detect prevalent cases with chest X-ray screening. Interventions such as isoniazid preventive therapy (IPT) or follow-up services to asymptomatic chest X-ray abnormal subjects should be piloted.

1.8. Improved access to culture examinations and introduction of new technologies such as Xpert MTB/RIF to improve case detection beyond MDR-TB cases, both in quality and quantity, should be piloted. These approaches should be evaluated by operational research concurrently with their expansion. Available resources and capacity should be mobilized in a coordinated manner.

1.9. The practice of TB diagnosis in children should be investigated and documented.

2. Laboratory network and introduction of new laboratory tools

Achievements

The standard of case finding by sputum microscopy has been uniformly good, reaching the expected coverage and target without compromising on the quality. The supply and quality of reagents distributed by the NTP are good, and most of the centres were equipped with functional binocular microscopes. The training materials, training curriculum, standard operating procedures and documentation accord with international recommendations, except for the diagnosis of TB where three sputum smears are still examined instead of two. This is one of the few countries where all three EQA procedures are in place, namely, random blinded rechecking (RBRC) on a monthly basis based on lot quality assurance sampling; six-monthly proficiency testing; and quarterly on-site evaluation. These efforts enabled the NTP to identify laboratories which commit major errors and to provide retraining without much delay. For this purpose, Myanmar as a whole is divided into upper and lower regions with

Yangon and Mandalay as their headquarters and two teams to cover the overall activities. Another important practice is enrolling a substantial percentage of private laboratories in EQA practice. At present 380 out of 415 microscopy centres are covered under EQA. In 2010, the percentage of major errors under RBRC was 1.3% and 1.7% for public- and private-sector laboratories, respectively, and for the first two quarters of 2011, the corresponding figures were 0.9% and 1.1%, which is a significant achievement. This would improve further by filling the remaining 25% vacant posts for laboratory technicians.

During the past years, the NTP has strengthened the conventional culture/DST laboratories at Yangon and Mandalay, and the quality of the laboratory data was being periodically assessed by the WHO Supra-National Reference Laboratories of Antwerp, Belgium, and Bangkok, Thailand. With the assistance provided by UNITAID through EXPAND-TB, the Foundation for Innovative New Diagnostics (FIND) has supported the establishment of two biosafety level 3 laboratories at Yangon and Mandalay and introduced newer diagnostics including automated liquid culture, rapid speciation of *M. tuberculosis* complex by immuno-chromatographic lateral flow assay and molecular diagnosis of TB by line probe assay (LPA) in 2010. External as well as on-site training, periodic monitoring and mentoring, and supply of equipment, consumables and reagents have been provided since then.

Excellent concordance between conventional and rapid methods was demonstrated between solid versus liquid culture and also between LPAs and solid and liquid. The level of contamination with regard to liquid culture and LPA providing interpretable data was within accepted limits. These achievements pave the way for the rapid diagnosis of TB and MDR-TB cases.

Challenges

The two culture and DST laboratories at Yangon and Mandalay are inadequate to cover the diagnostic needs of the whole country for reasons of limited capacity, human resource requirements, challenges faced in specimen referrals, transportation of samples within 48 hours, maintenance of cold chain during transport, reporting results on time and the difficult and diverse terrain of the country. To overcome these obstacles, every state/region should ideally have a similar facility to meet the diagnostic needs of the population. As building such an extensive capacity would be very time-consuming and labour-intensive, such an approach would result in a prolonged delay and continuous suffering of the patients. To overcome this, the recently introduced (and WHO-endorsed) Xpert MTB/RIF test, which is indicated for use at the peripheral level of the health services for the diagnosis of TB and detection of rifampicin resistance, should be established at the intermediate level laboratories as a first step, since this test provides results within a few hours, a significant advantage compared to routine culture and DST. After gathering enough evidence and expertise, this facility can be extended to the lower level of the health system. The NTP and partners should work together to evolve a diagnostic algorithm to support such an activity and also for the sustainability of this approach in the long run.

Recommendations

2.1. EQA coverage of private sector laboratories for sputum smear microscopy to be increased. High error rates observed for smear microscopy to be brought under control by providing additional training and sensitization, and uniform specimen referrals, reporting and recording by private sector laboratories to be expedited.

2.2. Vacant staff positions in almost 25% of the diagnostic microscopy centres under the NTP should be filled, adhering to a definitive timeline. Vacant microbiologist positions should be filled as early as possible.

2.3. At least three additional microbiologists should be trained on Good Laboratory Practice and also on newer diagnostics at NTRL, Yangon.

2.4. Long-term planning to be made to reach a goal of establishing at least one culture and DST laboratory in each state. As a first step, a time-bound plan to be made to develop two regional laboratories.

2.5. As NTRL Yangon provided solid evidence on the use of newer diagnostics for the detection of TB and MDR-TB, results obtained by these methods must be taken into account for diagnosis and monitoring of patients by the NTP without further delay.

2.6. Existing two culture and DST laboratories must be used optimally by increasing specimen referrals from other regions, states and

townships. The relevant specimen shipping procedures employing optimal biosafety norms are to be followed.

2.7. As the UNITAID-supported EXPAND-TB activity will end in December 2013, NTP should plan sufficiently in advance the procurement, supply logistics and stock management of consumables and reagents for newer diagnostics.

2.8. Likewise, annual maintenance contracts are to be established for the maintenance of biosafety level 3 laboratories and also major equipment at these sites.

2.9. Plan to establish Xpert MTB/RIF test at every state/regional level laboratory as a first step to diagnose TB and rifampicin-resistant TB.

3. Treatment

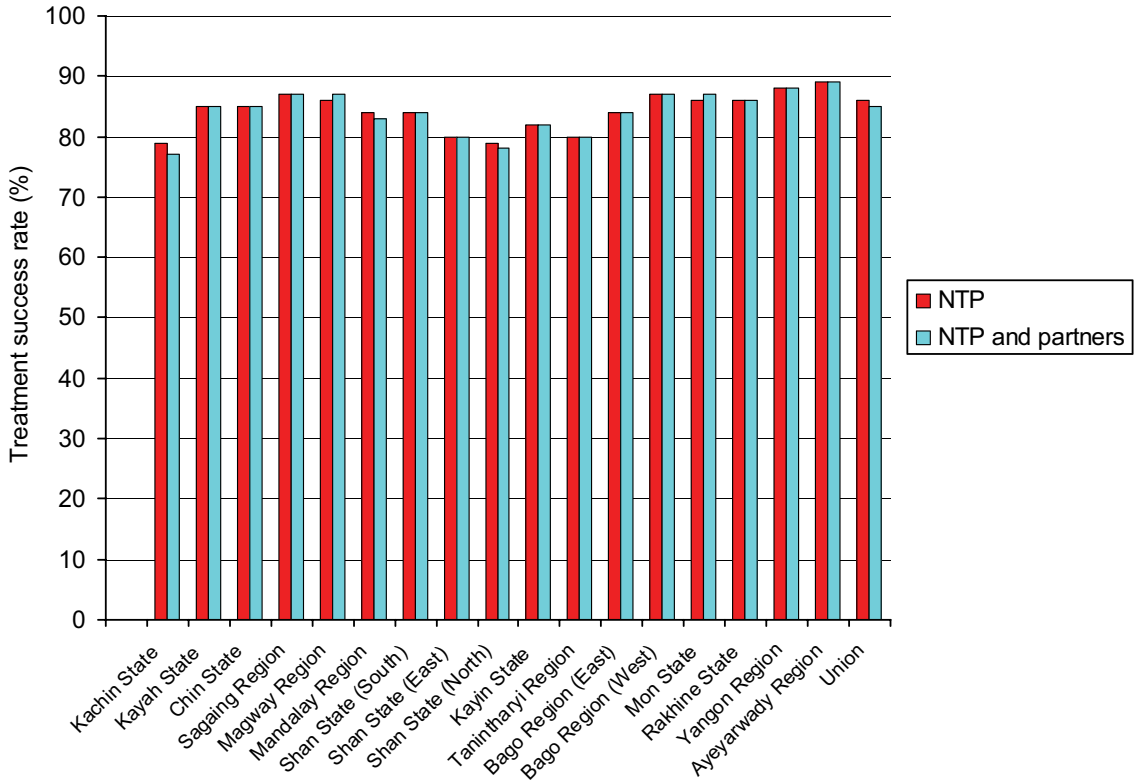
Achievements

The WHO-recommended formulations of anti-TB drugs and fixed-dose combinations are being followed. For adults, category I and II are used (Category III with three-drug initial phase was phased out in March 2010). Since 2010, pre-packaged patient kits are used all over the country. For children, the latest order of drugs from the GDF followed the recommendations of the WHO 2010 Rapid advice: treatment of tuberculosis in children.

DOT providers are assigned for all patients and are selected mainly from family members but also from BHS or volunteers, especially from MMCWA, MWAF MRCS. Treatment success rates are reaching 85% on average (Figure 9). To reduce default rates, early missed dose tracing is in place in most areas. In townships of low performance (based on case-finding and treatment outcomes), meetings are conducted with health-care staff and volunteers to improve performance (10 townships have monthly meetings and 10 townships have quarterly review meetings).

NGOs (including MMA and PSI) provide allowances and incentives to patients. The NTP provides allowances and incentives to MDR-TB patients only.

Figure 9. Treatment success rates by states/regions and for the whole country, 2010.



Challenges

Through the overall expansion of TB control activities it is expected that case notifications will increase. With the available human resources it will be challenging to sustain the high treatment success rates. The workload of BHS is expected to increase as TB and other disease prevention/control programmes expand and as such there could be a reduction in the quality of supervision of patients and DOT providers. DOT is not strictly followed by health-care workers and by NGO volunteers.

Recommendations

3.1. Reinforce family member DOT by information/education and short training of family members.
3.2. Expand community-based DOT by local and international NGOs.
3.3. Engage cured TB patients in community-based care activities.
3.4. Revisit the weight band dosages since there are inconsistencies between national and WHO guidelines.

4. Procurement and logistics

Achievements

The NTP is responsible for provision of first- and second-line anti-TB drugs and the required laboratory reagents and supplies for diagnosis and treatment of TB patients to all the implementing partners across the country.

The programme has ensured an uninterrupted supply of first-line anti-TB drugs despite the limited availability of financial resources since 2002. The good programme performance combined with staff dedication and encouraging MOH leadership attracted additional funding from bilateral agencies following the 2008 partner meeting. The GDF provided an exceptional one-year support which covered programme needs in first-line anti-TB drugs for 2009, followed by 3DF support in 2010 and support from the Japanese Government in 2011. The staggered planning and thorough follow-up allowed the programme to avoid stock-outs and link the needs with the long-term Global Fund Round 9 grant funding.

Well-coordinated central procurement of anti-TB drugs and supplies remains an achievement of the programme despite the wide range of funding and implementing partners available in the country. Based on programme needs, the NTP jointly with WHO/GDF, the United Nations Office for Project Services (UNOPS) (Global Fund Round 9 grant) and other funding agencies (Japanese government and 3DF) estimates the programme's annual requirements and requests timely placement of local and international orders. It was noted, however, that at least one international NGO procured first-line drugs, a substantial stock of which is due to expire. It is therefore imperative that the programme continue coordinating and approving procurement of anti-TB drugs and supplies through all partners, hence avoiding duplication of efforts and ensuring best use of scarce financial resources.

The level of government funding for procurement of anti-TB drugs has gradually increased in accordance with the partners' agreement of 2008, and reached US$ 150 000 in 2010. The amount was said to be used for local procurement of streptomycin, syringes and water for injections. Due to restricted access, 36 townships were excluded from the Global Fund Round 9 grant funding. These townships notified 2830 cases to the national pool in 2010. The number of cases will increase as the programme, in light of the prevalence survey findings, plans to reach the unreachable, and there will therefore be a need for additional funds to provide anti-TB drugs for treatment. The programme must ensure timely and uninterrupted provision of quality-assured treatment to these townships through government funds for the period from 2012-2015 or until funds are secured from other sources.

Upon arrival of goods to the country, drugs and supplies are delivered to the NTP Central and NTRL stores in Yangon. Distribution of all supplies to the region/state stores and further on to health facilities is planned for and done on a quarterly basis. Funding for distribution is provided through 3DF until the third quarter of 2011 and will be continued thereafter through the Global Fund.

Basic maintenance and provision of necessary furniture and equipment to the NTP central and two regional stores is included in Global Fund Round 9 grant, while six state stores will be supported through JICA. The NTP central store currently has an adequate storage space, but with expansion of the MDR-TB project the programme will require additional space and must plan for it in advance.

The current storage management practices for second-line drugs were inadequate in the health facilities visited. It must be improved through provision of shelves and cabinets, and where necessary by combining storage of anti-TB drugs with general medicines. Due to short shelf life and high costs, management of second-line drugs is complicated and requires substantial attention. Staff must be trained and where required refresher trainings are to be provided in basic store management, which shall be followed by regular supervision to ensure day-to-day use of learnt skills and practices.

Supervision and monitoring were considered weak in supply management chain. Drugs with short shelf life were pushed to the periphery, so a substantial quantity of them may expiry unless redistribution is urgently initiated. Discrepancies in recording and reporting and incorrect issuing of drugs to partners and patients were observed at the stores and health facilities visited. With an expansion of the MDR-TB pilot project, management of second-line drugs (which is more complicated, as mentioned above) will be the responsibility of NTP and the assigned state stores and health facilities staff. The staff workload will increase and rigorous supervision at all levels will be required to avoid and reduce wastage of drugs due to shelf life expiration. The NTP and partners must ensure recruitment of procurement and supply management focal persons (one pharmacist and one assistant pharmacist) at the earliest opportunity to strengthen supply chain management and to ensure that timely supervision and trainings/refresher courses are taking place.

Visits to local rural/urban drug outlets revealed wide availability (brands, strengths and packaging) of both first- and second line anti-TB drugs in urban areas, sold mostly without a prescription. The full treatment course for a new smear-positive case may cost around US$ 62-85. However, all outlet keepers interviewed (8) confirmed that no patients had bought a full treatment course in the previous 12 months. It was mentioned that the number of clients buying anti-TB drugs has gone down, although not significantly, over the same period. The programme must ensure that drug regulatory authorities restrict availability of first-and second-line anti-TB drugs in the private drug outlet network to fixed-dosage combination drugs and to strengths that are agreed under the NTP treatment guideline. Anti-TB drugs must be issued on a prescription basis only.

In accordance with the WHO 2009 revised TB treatment guideline and the 2010 Rapid Advice for treatment of children, the paediatric regimen currently used in Myanmar (a setting with a high prevalence of HIV and MDR-TB) must be strengthened by adding ethambutol into three fixed-dose combinations (rifampicin, isoniazid, pyrazinamide) and the programme should discuss and consider revision of its guideline.

Recommendations

- **4.1.** Initiate timely procurement of quality-assured anti-TB drugs using government funds for districts not covered by the Global Fund Round 9.
- **4.2.** NTP approval must be granted for procurement of all anti-TB drugs by funding or implementing partners.
- **4.3.** Ensure provision of basic furniture/equipment for all facilities handling second-line drugs and plan for extra space in advance at central/state levels.
- **4.4.** Recruit full-time Procurement and Supply Management focal person/s (through Global Fund reprogramming) to strengthen supply management practices and to ensure regular supervision.
- **4.5.** Add ethambutol to paediatric regimen and request GDF to include it in the 2012 grant order.
- **4.6.** Closely monitor short-shelf-life drugs and ensure their use at closest and busiest treatment facilities, if and when required.
- **4.7.** Through the national drug regulatory authority, restrict availability of first- and second-line anti-TB drugs to fixed dosage combinations and NTP-approved strengths only; issuance per prescription and per registered provider only; consider wider involvement of drug outlet keepers in DOTS provision.

5. Supervision, Monitoring and Evaluation

Achievements

Supervision visits are conducted at different levels. States and regions are visited by the central level at least once a year. State and regional TB officers conduct supervisory visits to districts and/or townships on a quarterly basis, barring some remote areas. WHO-

contracted and Global Fund-funded National Technical Officers supplement government staff, especially for supervision. They are based at state/regional level and rove around their designated area, supporting supervision, training, planning and monitoring. A standardized checklist is used. Supervision visits are often incomplete, with due attention being given to the TB clinic and/or laboratory but TB stores frequently ignored. The outcome of supervision could also be further improved if the supervisor would leave a written record or provide feedback on his findings.

Record-keeping and data analysis generally appear to be fair. The standardized DOTS forms, registers and reports are firmly in place and well understood. With the exception of private general practitioners who report through the local MMA office or the headquarters of PSI, all implementing partners submit reports to the townships/districts in which they are operating. In the case of PSI, the local health authorities receive the contributions of the private sector late, giving a rather incomplete picture of TB performance at their level of authority. Data assistants, recruited under the same mechanism as National Technical Officers and also based at the state/regional level, also provide support for data compilation, reporting, planning and monitoring.

The NTP produces an excellent annual report highlighting its main achievements and providing programmatic data up to state/regional level. This document is very important for institutional memory. Partner NGOs also produce valuable documents and reports.

Periodic evaluation meetings take place at central and state/regional levels. A summary sheet on TB status and NTP performance is prepared and discussed during these meetings. Partners of the NTP routinely attend these meetings. Efforts are undertaken to improve the situation in areas that were identified as having low performance. The performance rating, however, is often solely based on achieving targets versus the basic indicators for case detection and/or treatment success, and does not necessarily include other aspects of programme management. It is expected that closer follow-up after the training courses on MIFA (management information for action) and EBDM (evidence-based decision making) will further enhance the local impact of TB control interventions.

Challenges

Supervision suffers most when the post of district TB team leader is vacant. The lack of own transport and dependence on public transport also works as a disincentive for conducting supervision. Delayed reimbursements by the Principal Recipient, caused by late submission of claims by staff as well as by a lengthy clearance process on behalf of the Principal Recipient, also demotivate supervisory staff, who must advance travel funds from their own pockets (which could be significant if domestic flights are involved).

Supervision almost never includes systematic follow-up on trained staff, thus foregoing the opportunity for mentoring trainees and accompanying them for putting into practice the knowledge and skills that they have acquired through formal training. On-the-spot training to correct identified errors does, however, take place.

Supervision could further be enhanced by promoting joint visits by the NTP, WHO and partners. While the more intensive supervision schedule of some partners should be respected, it is still observed that these same partners are not necessarily present when the NTP undertakes its supervision visit. This sometimes results in conflicting messages being conveyed to the facility staff.

Recommendations

5.1. Joint supervision between different partners (NTP, NGOs, WHO, PPM) should be promoted.

5.2. Adequate transport facilities should be made available at township level.

5.3. Supervision should include all relevant sites including TB stores, laboratories and partner facilities. Partners should provide timelier reporting to the township and/or state/regional level. An interim report submitted when all other reports are prepared at the local level may serve the purpose.

5.4. Written records with recommendations should be left at the centre visited. Staff-in-charge should document follow-up actions in Action-Taken report.

5.5. Supervision should be used for post-training follow-up.

6. Human resource development

Achievements

The NTP has continued to make considerable progress in the area of human resource development (HRD) for TB control. The HRD structure has been strengthened continually and HRD and the strategic directions for it are very well reflected in the five-year "National Strategic Plan for TB control 2011-2015". The draft "Expansion Plan for the Diagnosis of and Treatment of MDR-TB" includes a section on HRD and highlights the needs for additional staff at all levels as well as the need for ongoing training. The plan proposes a formal human resources (HR) assessment to address both the overall national TB strategic plan and to specifically address the HR needs for MDR-TB activities. Similarly to the findings during the 2007 mission, the review teams met many dedicated, talented persons who are doing impressive work under often difficult circumstances.

Progress has been made on implementation of the recommendations from the previous review, however many of the recommendations are of a long-term nature and remain valid.

Major efforts have been made by the NTP and partners in capacity-building. Training activities in 2010-2011 for staff at all levels of the health system (with funding from 3DF, Global Fund, JICA and WHO) using translated and revised WHO modules for district and BHS, have resulted in the majority of BHS and district-level staff being trained. In 2010, a total of 2858 BHS staffs were trained. The total number of different categories of trainees in all trainings in 2010 was 4989. Partners have also contributed to capacity-building by conducting trainings and workshops for staff in the areas they operate in.

The Department of Medical Science of MOH is responsible for training and production of all categories of human resources for health. There are a total of 14 medical and health-related universities and 46 nursing and midwifery related training schools under the department. The NTP is involved in teaching in basic trainings; however, not all curricula are up to date with regards to the formal inclusion of the public health aspects of TB control following national policies and guidelines.

Additional staff have been contracted through partner agencies (NGOs and international organizations) with funding from 3DF and Global Fund. Recent provisions from the central government mean that an additional 500 doctors and approximately 200 laboratory technicians will be employed in the near future to start to fill vacant positions.

Challenges relating to training

- All trainings – and training of BHS staff and DOT providers in particular – are facing the challenges of training big numbers of staff while maintaining quality, including ensuring evaluation and follow-up of training during supervision and regular meetings, and scaling up training. The number of participants in each training course is in general high and raises concerns about the courses' effectiveness.
- No standardized data collection at district and state/regional level with regard to staffing and training "status" or needs.
- Limited Training of Trainers (TOT), despite the fact that many staff at different levels are responsible for conducting trainings.
- Need to update standardized training material to reflect recent policy development.
- Need for planning regular training activities – as turnover of staff creates ongoing needs for training – and for regular ongoing training to update new strategies and interventions. Changes in the current NTP strategic approach following the results of the prevalence survey will have a major impact on future training needs, as more providers and partners will need to be involved. There are also major vacancies both in the TB system and in the general health system which, when filled, will create additional training needs. A system (including funding) to ensure that these ongoing training needs are met is not yet in place.

Challenges related to staffing

- Due to persistent staff shortages at the central level there is still no full-time national HRD coordinator. This is of overall concern as the scale-up of interventions will have major consequences for training and staffing needs.
- The NTP has 101 vertical TB teams under the 14

regional/state TB centres. Of the 1028 sanctioned posts in these vertical teams and for support from national level, 334 (32%) are vacant. Vacancies have increased compared with 2007, when there were 239 vacant positions in the TB team structure.

- Major constraints in staffing at all levels:
  - Significant vacancies, in both NTP-specific positions and the general health system. Major concerns related to the shortage of midwives and laboratory technicians.
  - Overburdened staff, in particular at township level and when there is no TB team (impacting in particular the possibility to supervise), and at BHS level.
  - Insufficient staffing at central, regional/state and district levels to enable full support in implementation at lower levels of all programme components.
  - High turnover in some places.
  - Motivation of staff is variable, and health system deficiencies are affecting motivation.
  - Additional staff needs for implementation of TB/HIV and management of MDR-TB (including reference laboratory).
  - Limited/no use of non-financial incentives and motivators/recognition of good performance.
- Limited coordination with other disease control programmes and interventions (e.g. MCH, GAVI Health System Strengthening activities) with regards to "demands" on BHS staff and midwives in particular.

Recommendations

6.1. Update and finalize the draft 2006-2007 HRD strategic plan and ensure that it reflects coordination and collaboration with health system strengthening projects (with HR components) such as GAVI and the upcoming 3MDG fund and other programmes and interventions, e.g. MCH, HIV/AIDS. An essential activity of the plan should be a formal HR assessment to address both the overall national TB strategic plan and to specifically address the HRD needs for MDR-TB activities.

6.2. Develop annual/biannual implementation plans with standard agendas, evaluation forms, reporting forms etc.

6.3. Strengthen management capacity at the central level and state/regional level.

- **a.** Review possibilities of contracting additional staff at central and state/regional level (MOH to consider modifying the policy of restrictions in staffing to allow NTP to contract additional staff with external funding).
- **b.** Add a reporting format for training and staffing to quarterly/biannual reporting (see example in the WHO R&R formats developed in 2006).
- **c.** Continue management capacity-building of state/regional TB officers (e.g. annual workshop).

6.4. Urgently address vacancies in both the general health system and the TB system as well as assessing short- and long-term additional staff needs in collaboration with other programmes and interventions.

6.5. Develop a system of non-financial incentives/motivators to reward high-performing teams/individuals (or teams/individual having made major progress in the past year). Such motivators could include but not be limited to: certificates signed by the NTP manager; public recognition during World TB Day celebrations; participation in international trainings and conferences.

6.6. Continue to strengthen quality, follow-up and evaluation of training activities at all levels.

- **a.** Strengthen follow-up of training during supervisory visits.
- **b.** Utilize regular meetings to reinforce all aspects of quality of training.
- **c.** Organize additional TOT by adding TOT to the "regular" planning of trailing activities.

6.7. Update training manuals and modules to reflect recent policy developments.

6.8. Strengthen collaboration with the Department of Medical Science for revision and upgrading of curricula for graduate and postgraduate training to conform with policies, guidelines and public health approaches for TB control in Myanmar.

7. Childhood TB

Achievements

Immunization coverage with BCG in children under one year of age was 93% in 2010, up from 76% in 2005.

In 2010, a total of 32 471 children (<15 years old) were reported with TB. Of these, 302 were smear-positive: 106 (35%) male and 196 (65%) female. Primary complex was diagnosed in 21 427 children, of whom 9334 were younger than five years and 12 093 were 5-14 years old. The diagnosis of hilar lymphadenopathy was made in 4527 children below five and in 5377 children 5-14 years old, in total 9,904 cases. TB meningitis occurred in 838 children (370 younger than five and 468 5-14 years old). There is a (small) number of other forms of TB in children, however no disaggregated data for these were available.

TB in children is thus significant. In 2010, a total of 140 737 patients were notified to the NTP. Children made up at least 23% (primary complex 15%, hilar lymphadenopathy 7% and TB meningitis less than 1%). The proportion of children appears to have peaked. It is not clear if this reflects a real trend or a reduction in notifications. The proportion of primary complex also seems to have (slightly) decreased. There are no national data available for children co-infected with HIV. The HIV Care Programme in Pakokku had already enrolled 16 children with TB/HIV in 2011 and 73 over the past 4.5 years. Of a total of 78 children with TB/HIV enrolled in Taunggyi, 54 (69%) also received antiretroviral therapy (ART). The Integrated Health Care (IHC) project has registered 12 787 TB patients in the last 4.5 years, of whom 4041 (31.6%) were HIV positive, including 107 children. There are no children diagnosed with MDR-TB, as a result of limited culture and DST. Moreover, children were excluded from MDR-TB diagnosis and treatment in the MDR-TB pilot project. However, in the revised MDR-TB guidelines (to be finalized in 2012) children are included.

A set of "National Guidelines on Management of Tuberculosis in Children" was developed in 2007. In 2011, the recommendations of the 2010 WHO "Rapid Advice – Treatment of tuberculosis in children" were added as an annex to the guidelines. The guidelines are a consensus document and contain advice on drug regimens, paediatric formulations, dosages, symptoms and diagnostic investigations. Diagnosis depends strongly on chest X-ray reading of primary complex. There is, however, a disparity in definition of primary complex and extrapulmonary TB. The radiologic reading of primary complex on the ground may only be based on perihilar nodes seen since other features of the Ghon complex are not easily captured and hilar nodes are the only constant element observed for most cases. This disparity may distort disease classification and the frequency of cases reported.

Challenges

The burden of childhood TB is unknown. The nationwide disease prevalence survey counted only people above 15 years of age among its subjects. The revised estimates for total prevalence and incidence included children. The estimated numbers, however, were based on modelling and extrapolation.

The diagnosis of TB in children is characterized by a paradox. On the one hand there is likely a significant underdiagnosis, with many children remaining undiagnosed and even dying, while on the other hand overdiagnosis does occur. Underreporting is probably due to poor access especially when patients need to travel long distances or where travel is expensive. Referral is often necessary adding to the cost as well as diagnostic delays. The opportunities for recognition remain underutilized. Overdiagnosis is likely when guidelines for diagnosis are not closely applied.

TB control in children is closely linked to adult TB control. Tracing of contacts of index adult cases or identifying possible source cases for TB in children is not systematically done. Children of migrant workers are disproportionately vulnerable and pose additional challenges from the point of view of care.

Recommendations

7.1. In order to increase case-finding, two entry points should be given more attention:
(i) through a child with TB symptoms when known to be exposed to an index case; and
(ii) through the registered adult for contact tracing especially among children. Children who are contacted will need more investigation and adherence to more specific guidelines (to be formulated) so as not to depend solely

on chest X-ray or tuberculin skin test (TST). Special attention is also to be paid to children of particular vulnerability, including migrant workers.

7.2. Clinical evaluation of children should be improved with some simple tools for periodic measurement of height (metre stick) as is done at a paediatrician's clinic, from where children can then be referred to the TB clinic.

7.3. Sputum examination including in children younger than 10 years can be further promoted. Induced sputum procedures may be adopted for increased yield of sputum smears in children with progressive disease.

7.4. Consider revisiting the TST, which has many uses as a tool for establishing infection and confirming exposure.

7.5. The National Guidelines should incorporate the recommendations of the 2010 WHO Rapid Advice – Treatment of tuberculosis in children (i.e. adding ethambutol to the regimen as a result of the HIV epidemiology and rates of isoniazid resistance).

7.6. To better understand the burden of TB in children, two age groups (0-4 and 5-14 years) should be disaggregated in TB notification reports. In addition, age distribution should be recorded and reported for all forms of TB cases.

7.7. Isoniazid preventive therapy should be systematically given to all children younger than five years who are contacts of a positive index case and only after active disease is unequivocally ruled out.

8. Multidrug resistant TB

Achievements

Since the last review of 2007, pilot projects for the treatment of MDR-TB, together with laboratories able to carry out DST, have been established in Yangon and Mandalay. From July 2009 to the end of August 2011, 291 MDR-TB patients have initiated treatment in collaboration with Médecins Sans Frontières (MSF) Holland. A total of 28 MDR-TB patients have completed the treatment, of whom 71% have been cured. These initial results are very promising, especially since all enrolled patients were chronic TB patients who had been on a waiting list for treatment with second-line anti-TB drugs. In other states and regions visited, patients were being referred for culture and DST, only some of whom were actually known to have been tested, and some of whom received a diagnosis of MDR-TB. The status of these patients was unknown. If the MDR-TB rates found in the drug resistance survey of 2007-2008 are applied to the cases notified in 2010, then there should have been 4200 cases of MDR-TB among the 99 158 new pulmonary cases that year, and 1000 cases among the 10 269 retreatment cases. As of November 2011, five XDR-TB cases had been diagnosed. Thus the public sector in Myanmar is treating only a tiny proportion of the MDR-TB burden.

An excellent draft Expansion Plan was prepared early in 2011, most elements of which are now approved, although there is still some debate about the regimen to be used. The current cost of a course of second-line drugs obtainable from the GDF is about US$ 6000 for the current regimen of six months amikacin/levofoxacin/ethionamide/PAS/cycloserince/pyrazinamide and 18 months without amikacin, and about US$ 2000 for the same regimen without PAS.

Approval by the Green Light Committee was initially obtained for 275 patients and in April 2011 for 1800 patients. At the time of the review second-line drugs had been delivered to the initial 275 patients while the first delivery of drugs by the Principal Recipient of the Global Fund was expected in November 2011. As a result, there is now a waiting list of some 200 cases. Moreover, this waiting list is about to expand rapidly. While no rapid DNA-based diagnostic tests are currently being carried out in Myanmar, three Xpert MTB/RIF machines are expected in the coming few months. These machines may primarily be intended for the diagnosis of TB in high-risk groups, but an unavoidable "side effect" will be the diagnosis of additional cases of MDR-TB. Pressure can therefore be expected to increase significantly for greater availability of treatment.

Clinical care is assiduously carried out, with meticulous attention to baseline assessments. Nutrition and social supports are available, and the two patients interviewed received the social support and transport subsidy (Kyat 20 000 and 5000, respectively). BHS also receive, reliably, Kyat 40 000 per month per patient under supervision.

We observed a high morbidity rate among the patients on treatment. Some of this, as well as the deaths

from respiratory failure, is likely due to the stringent inclusion criteria used in the pilot phase which require having to fail Category II treatment before MDR-TB treatment can start. We would underline the importance of expanding DST to additional groups, as advised in the expansion plan, namely all retreatment cases, close contacts of MDR-TB patients with active TB, and all HIV infected patients at the start of TB therapy, as well as failures of Category I and II. Essentially, the entry point for MDR-TB treatment should simply be a positive diagnostic test for MDR-TB, with priority given to those with HIV infection, who are at a much greater risk of death from untreated TB than other risk groups (see below under Challenges).

In general, apart from a few hospital-based specialists, private practitioners are not treating for MDR-TB. Since they must be seeing MDR-TB patients, knowingly or otherwise, a PPM approach for MDR-TB would likely yield results.

Challenges

While the cost of treating MDR-TB remains so high, treating all notified cases cannot be achieved within the current TB control budget for Myanmar – even assuming the budget gap is filled. This emphasizes the crucial importance of ensuring that the quality of basic DOTS is as high as possible, in order to reduce the production of MDR-TB as far as possible. However, while treatment of MDR-TB is available to so few the risk remains, over the next several years, of replacing the chiefly drug-sensitive strains circulating today with mainly drug-resistant strains, which would be catastrophic. Therefore steady expansion of the existing MDR-TB pilot sites is needed, in line with available resources.

WHO is working hard at the international level with many partners to obtain price reductions in these much-needed commodities. In particular, it is building consortiums to approach UNITAID for expanded provision both of new, rapid DNA-based diagnostic tests and second-line drugs.

Recommendations

8.1. Careful expansion of MDR-TB treatment, commensurate with availability of resources, in order to establish the expertise and experience in management of such cases, while international efforts are made to reduce the cost of the second-line drugs. In the meantime the highest priority needs to be given to ensure that first-line treatment is done to the highest standards. In particular, more resources should be directed to the staff required to secure DOT, monitoring and supervision to prevent the emergence of MDR-TB.

8.2. Detect MDR-TB earlier, deploy rapid diagnostics and improve laboratory capacity as detailed in the draft Expansion Plan for MDR-TB.

8.3. Urgently secure second-line anti-TB drugs to meet the current and projected shortfall for MDR-TB treatment, commensurate with availability of resources.

8.4. Should MDR-TB treatment be started based on a positive MTB/RIF test for rifampicin resistance? This depends upon the circumstances:

- **a.** If the patient comes from a population known to have an MDR-TB prevalence greater than 15%, which is certainly the case for Category II failures, then there is a more than 90% chance that the patient genuinely has MDR-TB, and starting treatment would be wise, while requesting a confirmatory DST (as in the draft expansion plan).
- **b.** If an HIV-infected patient has a positive MTB/RIF test, and this is clinically consistent with the other findings, then treatment should start immediately because the likelihood of an effectively untreated HIV infected patient with MDR-TB dying while waiting for a confirmatory test is very high.
- **c.** If an MTB/RIF test unexpectedly shows rifampicin resistance in a routine TB suspect, where the likely MDR-TB prevalence is <15%, then the clinical history should be carefully reviewed to see if the patient is in a higher risk category, such as a contact of a case of MDR-TB, or HIV-positive. If no such risk is found, the result of a confirmatory test should be obtained prior to starting treatment.
- **d.** If the patient is clinically unwell, or becomes so while waiting for the confirmatory test, consideration should

be given to confirming the result with another rapid diagnostic test such as LPA, or repeating the MTB/RIF test with a different specimen, and starting treatment straight away.

8.5. Remove PAS from the routine regimen for MDR-TB treatment – as in the MDR-TB Expansion plan – and with the provisos therein.

8.6. Private practitioners should be approached to define the process needed to refer cases suspected to have MDR-TB to the treatment centres, where possible.

8.7. The MOH should consider establishing an MDR-TB PPM project to learn the lessons for probable future expansion in Myanmar.

8.8. Given the restricted number of laboratories capable of carrying out DST, transport procedures for sputum should be defined and disseminated.

9. TB/HIV

Achievements

Over the last several years, the NTP and NAP have collaborated to begin to address the challenge of TB/HIV. In 2003, the NTP and NAP developed collaborative clinical manual for diagnosis and treatment of TB and HIV infection. For several years, sentinel surveillance has provided valuable information on the extent and trends of the burden. With support from 3DF, most regional and state TB and HIV teams began regular collaboration between the vertical clinical services operated by the teams in the capital cities.

A number of pilot projects, altogether involving 15 townships, have devised excellent models for collaborative services for populations. The Union's IHC initiative deserves special recognition for pioneering a care model, starting with HIV screening among TB patients and ART for HIV-infected TB patients (and spouses). The IHC model has evolved into IHC+, a full-fledged ART programme – i.e. it no longer limits ART to TB patients – but remains combined with TB/HIV collaboration and decentralized ART at the township level for stable patients. Most notably, the IHC model is embedded within the public sector, and seeks to follow the integration and support principle articulated as "for, by, and with the public sector". Currently IHC+ provides services to 15 townships and its success can be measured by recent reports: in the third quarter of 2011, IHC reported that 88% of adult TB patients were screened for HIV, and among HIV-infected TB patients in earlier quarters, 60% had initiated ART.

Furthermore, on a small scale but of importance to local high-risk populations, some implementing partners from both TB and HIV have independently included TB/HIV activities within their projects, such as TB screening in targeted intervention sites or ART centres.

In addition, the NAP and NTP are jointly piloting the provision of IPT for people living with HIV or AIDS (PLHA) attending ART centres, in collaboration with IHC+ and MSF Holland, at ART centres in Mandalay, Lashio, and Tachileik.

Challenges

The first major challenge is simply the scale of HIV infection among TB patients in Myanmar. Sentinel surveillance in aggregate has shown that 10% of tested TB patients are HIV-infected but with a high variation among survey sites.

HIV testing and treatment services remain limited in scope. TB/HIV models relying on traditional voluntary confidential counselling and testing (VCCT), as done for most-at risk populations with the intent of risk behaviour modification, are challenged by the limited access to VCCT services. ART remains limited to a fraction of those estimated to need it. HIV test kits are subject to procurement and supply chain disruptions, and are often reserved for some subset of testing needs (i.e. pregnant women, blood units) irrespective of the balance of local needs. Underscoring all the service delivery limitations are resources for HIV treatment, which have grown but remain well below the need.

A key opportunity comes from the strong commitment at the national level, expressed from the Health Minister through the National Programme Managers for the NTP and NAP, to rapidly taking TB/HIV collaborative activities to a national scale.

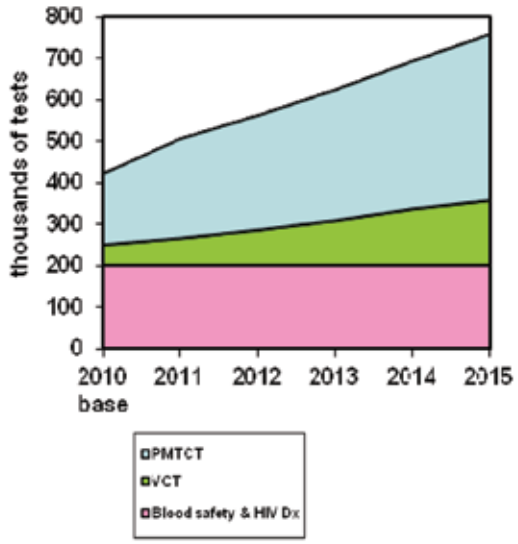
Important contextual findings make this ambitious scale-up eminently feasible in the great majority of settings. First, the models for scale-up have largely been developed and can be implemented with the finalization of operational planning and settling on the normative guidance to be used in all settings. All

states and regions have some HIV and TB programme management units that can coordinate services.

Second, HIV testing services are already available nationwide, established by the efforts of the programme for Prevention of Mother-to-Child Transmission (PMTCT) and Blood Safety to strengthen health systems capacity for HIV testing. In informal interaction between the review team and the NTP, NAP and MOH officials, the NAP indicated that it would allow HIV testing of all adult TB patients from the NAP "township quota" of testing kits, i.e. it would seek to allow township quotas to be used for (1) blood units, (2) HIV diagnosis in TB patients, and (3) any other HIV diagnosis.

Third, the NAP has indicated a major scale-up of HIV testing nationwide, doubling the number of HIV tests conducted annually by 2015 (Figure 10). The great majority of this growth will be testing at the township level. To this end, the NAP is strengthening robust procurement and supply chains for quality-assured rapid whole-blood HIV test kits. These services do not require duplication of testing even in those limited settings where vertical TB services would be in place.

Figure 10. NAP plans for expansion of HIV testing, 2011-2015



Source: NAP national strategic and operational plan

Fourth, the NAP is scaling up ART services nationwide, planning to initiate ART for nearly 10 000 patients per year in 2011-2015, so that by 2015, 70 000 persons would have initiated ART. The wider availability of ART will be crucial to ensure maximum reduction of death among HIV-infected TB patients.

Recommendations

The single overriding recommendation for Myanmar is to plan and execute the scale-up of collaborative TB/HIV services. There are a number of well-developed pilot areas, covering approximately 8% of townships, and limited TB/HIV activities implemented by partners. Given the high prevalence of HIV in TB patients, the crucial need for expansion is clear. As a first step, all providers in the health system should be asked to evaluate TB patients for HIV, and to screen known HIV-infected persons regularly for TB.

Both programmes, and all patients, will benefit. The NTP may increase case-finding and reduce mortality. The NAP can rely on TB patients as an efficient source of HIV case-finding, often earlier in disease progression, allowing interventions to reduce HIV-related mortality (co-trimoxazole preventive therapy or CPT) and ongoing HIV transmission to partners.

Expanding TB/HIV collaborative services will require very little additional resources. No new staff is required beyond the regular TB and HIV service expansion already planned by both programmes. The critical enabling factors are strong township medical teams, HIV testing services developed under PMTCT/blood safety in nearly every township, and the clear urgency understood and expressed by both programmes about the need to rapidly expand services nationwide.

9.1. Develop National Framework for HIV and TB collaborative service, with clear policies, activities, and service scale-up plans.

9.2. Ensure that coordination meetings happen regularly at the national and state/regional level

9.3. Develop normative guidance for BHS on TB/HIV and integrate this into standard TB, HIV, and general health staff training materials, so that further stand-alone TB/HIV training will no longer be required. Elements to include in TB training are: special considerations for the diagnosis of TB in HIV-infected persons; treatment of TB in

HIV-infected persons; policy and procedures for HIV screening of all adult TB patients; when to suspect HIV in paediatric TB patients; and the importance of linking HIV-infected persons to CPT, ART, and comprehensive care to reduce death. In addition, the guidelines and training should include clarification on new HIV-related recording and reporting elements integrated into TB.

9.4. Rationalize TB/HIV recording and reporting by settling on standard simple national formats and systems, and harmonize these across all partners and projects. Integrate TB/HIV reporting elements into NTP and NAP routine reports so that stand-alone TB/HIV reports are not required. Deploy newly developed TB registers with HIV, CPT, and ART columns in all townships. This will require flexibility on the part of partners, who will have to transition from pilot-project-type information to routine information.

9.5. Scale up routine HIV screening of TB patients through the "diagnostic testing" approach. This will require working with NAP to re-allocate HIV test kits to allow for testing of TB patients. Prioritize those areas with adequate ART treatment capacity to scale up first, but scale up irrespective of local ART supply. Diagnostic HIV testing for TB patients in whatever health care facility they are diagnosed (township hospital) is also advantageous in that the limited pre-test information and assent used for any pregnant mother or HIV clinical concern should be applied to TB patients. Only establish HIV testing in TB services where no regular HIV testing service is available. The effectiveness of this activity can be monitored by the proportion of registered adult TB patients with known HIV status, positive or negative.

9.6. Strengthen provision of CPT from all township settings, and links of HIV-infected TB patients to ART services. At a minimum, HIV-infected persons should be provided CPT and support and counselling. Wherever available, patients should be linked to ART centres for evaluation and treatment.

9.7. For estimation of the burden of HIV among TB patients, transition from sentinel surveillance to routine testing. This means that the existing sentinel surveillance sites need not be expanded further as currently planned, and can be shut down as routine data through NTP reports becomes available.

9.8. Synchronize intensified case-finding screening symptoms with global guidelines. Deploy this standard system beyond IHC+ clinics to all NAP and partner ART sites, VCT and sexually transmitted infection (STI) services, and targeted interventions for high-HIV prevalence populations, with a single reporting format (integrated into the standard NAP report for whatever type of service).

9.9. Engage PLHA networks and communities to promote effective TB treatment literacy. All PLHA and families should be aware that unexplained local or constitutional symptoms could be TB, and that they should seek early care.

9.10. Evaluate and make national decision on the appropriateness of IPT in ART services.

10. Public–Private Mix

Achievements

Significant PPM progress has been made since the previous review mission in 2007. Myanmar is a good model for PPM scale-up globally. Scale-up has taken place at a nationwide level and the collaboration between PPM partners is very good. PPM activities can be summarized as follows:

- **Engagement of General Practitioners (GPs):** Several partners, led by MMA and PSI, have intensified activities to engage private GPs in TB control. MMA is implementing mainly scheme I (referral of suspects and cases) but is also scaling up scheme III (referral and treatment provision). PSI is implementing scheme III. At the time of this report at least 2127 GPs were involved, about half of them under scheme III.
- **NGO and partner involvement:** A number of international NGOs (JATA, Union, World Vision International, Pact, AHRN, IOM, Merlin, Malteser, MSF-Holland, MSF-Switzerland, Médecins du Monde) are involved in service delivery and/or outreach activities and three TBREACH projects (Union, IOM, PSI) are starting, with the aim of increasing case detection activities in different settings. Local NGOs are also involved, especially MMCWA, which started providing training for contact investigation and treatment support in

July 2011.

- **Public Hospitals:** Ministries of Labour, Home Affairs and Defence are collaborating with the NTP. At least nine large public hospitals are actively engaged and have established DOTS centres.
- **Laboratories:** The NTP has an external quality assurance system for 62 private sputum microscopy laboratories.
- **Other providers:** Presently, there are no organized efforts to engage with traditional healers, chemists, pharmacies or quacks.
- **Corporate sector:** MOH staff provides support to private company medical camps for workers in cement and rubber factories, and mines. These relationships are not with the vertical TB staff, but cases may be referred from the clinics. As part of its corporate social responsibility programme, the Total/Yadana consortium supports TB management in their pipeline area.

Though at a national level non-NTP providers account for almost 20% of TB cases, some townships report that up to 50% of TB (all forms) cases come from engaged GPs. The proportion of new smear-positive cases can be as high as 35%. Treatment success for patients managed by GPs in those initiatives has been similar to the outcomes in the NTP, although rates at hospitals are much lower. In certain townships visited (Thaton, Hpa-an) although not all GPs had joined one of the schemes through PSI or MMA, all were referring TB suspects to the NTP, which was encouraging.

Addressing recommendations made in 2007, the NTP developed a standardized format and mechanisms for recording and reporting PPM contribution to case detection and treatment success which was presented to the review team in all townships and states visited. PPM contribution appears in the programme performance data on township, regional/state or national level. The International Standards for TB Care have been distributed to GPs and specialists though trainings and meetings by MMA and some work has gone into involving them in the PPM scheme. PPM guidelines and a TB management manual for private GPs have been available since 2003 and a training manual for PPM was developed in 2008.

Challenges

Specialists are playing an important role in diagnosing and treating TB, in public and private hospitals as well as in their private clinics. Specialists in private practice (most of the specialists have a side practice in the private sector) are not part of the PPM projects under MMA or PSI. The specialist societies of MMA are not well engaged.

Hospital DOTS linkage is yet to be developed into a coherent approach with a guiding policy. Private hospitals (>10 in Yangon) are involved, but more needs to be done.

The prevalence survey showed that large proportions of people with TB will self-treat or go to drug sellers, pharmacies or quacks for initial treatment. Currently there is no official involvement of different informal providers. However, a TBREACH project with PSI will engage informal providers in Yangon and Mandalay in 38 townships, which may be used to provide lessons learned for scale up in coming years.

Though there is good coordination between PPM partners at the national level, operational coordination in townships is insufficient in many places. This issue had been flagged in the prior review. PSI case-finding and treatment data is not always shared with the township medical officer (TMO) on a timely basis, instead going to PSI Central and/or NTP Central before being relayed back to the TMO. Similarly, supervision of the PSI GPs is undertaken by PSI staff without involvement from the NTP. MMA is more integrated at the township level, with TB field coordinators and assistants supporting integration and recording and reporting.

As MMA is scaling up activities there is a need to strengthen MMA supervision and administrative capacity substantially. MMA has a small PPM team in the central office in Yangon. There are also branches on township level, but these local branches normally function as a forum for academic activities and lack infrastructure such as office space, support staff, and means of transport. There is limited experience in delivering public health interventions.

Anti-TB drugs are widely available in most pharmacies. Some sellers refer patients to the NTP, but most will sell a variety of anti-TB drugs in single-dose combination strips and multiple-sized tablets. The sellers could immediately recognize anti-TB drugs when requested, but did not know about correct duration or proper

treatment regimens which led to questions about those patients who self-treat or seek to buy drugs for treatment privately.

In 2010 PSI began paying Sun Quality Health GPs a small fee for every case of TB managed. This practice has been taken up by MMA and now both organizations use the payment as an incentive to join their networks as they vie for GPs. In addition, PSI pays 400 Kyats per slide read directly to the laboratory technician, most often at public microscopy centres.

Currently there is no full-time PPM focal point in the NTP. Since it will be difficult to allow full-time attention on PPM for a central-level NTP staff member, WHO may have to support this function.

Recommendations

10.1. Continue to expand PPM, while sustaining quality:

- Focus on engaging more specialists through MMA and hospital DOTS linkage, using adapted International Standards for TB Care.
- Explore PPM project for MDR-TB expansion as a way both to improve specialist involvement and to scale up MDR-TB patient care.
- Continue scale-up of schemes I and III nationally, with attention to adequate supervision and quality control.
- Involve other providers (drug sellers, quacks and pharmacists, healers) in scheme I.
- Continue to expand the EQA system for private laboratories.
- Expand hospital DOTS linkage, with priority for large public-sector institutions, in particular ensuring effective referral mechanisms by appointing a DOTS focal point in all involved hospitals.

10.2. Strengthen capacity for PPM coordination and supervision:

- Ensure that PSI reports to TMO in a timely manner
- Involve NTP at the State/Region and Township level for supervision of PPM activities for both PSI and MMA.
- Strengthen MMA supervision capacity at the central level and support establishment of state/regional-level MMA public health coordinator.
- Strengthen PPM team in NTP, through additional support from WHO.

11. Advocacy, communication and social mobilization and community involvement

Achievements

Significant achievements have been realized since the last review and there seems to be a definite focus on community participation, although current efforts may best be termed as only the beginning of a significant endeavour.

A knowledge, attitude and practices (KAP) survey was conducted in 2009. This provides an insight on knowledge levels of the community regarding TB transmission, source of knowledge regarding health in general and TB specifically, and treatment-seeking behaviour. It also established an evidence base for planning and developing health education tools. The survey reveals a high level of knowledge among participants regarding cough as a symptom for TB (more than 75% of respondents). However, knowledge regarding other constitutional symptoms like fever and weight loss being symptoms of TB was low (less than 17% for fever and as low as 2.7% for other symptoms). The KAP survey also found elements of stigma associated with a fear of disease transmission. Similar findings were also confirmed by the review team after interviewing several patients.

In order to strengthen community involvement, the programme has developed community training modules – available since September 2011 – and community guidelines are being finalized. The guidelines elucidate the objectives of community-based DOTS and the prerequisites and roles and responsibilities of various stakeholders. Though several options of incentives and enablers are discussed and their acknowledged role in strengthening TB care activities, the guidelines also state that this would not be sustainable through the public health system. Hence such activities are left to the NGOs.

To put its intentions of community involvement into

practice, the programme has embarked on newer initiatives for community participation through the involvement of MWAF, MMCWA, MRCS and MHAA. It was learned that none of the volunteers receive any incentive from the programme except for the supervisor who received a one-time payment for mobility.

There is also a strong involvement of several international NGOs like IOM, JICA, Malteser International, Merlin, MSF, Pact Myanmar and World Vision in community mobilization activities. These agencies have wide geographical distribution and in some cases specific target populations, such as migrant workers for IOM. Some of the volunteers working for NGOs receive monthly remuneration for their activities. All community-based activities focus on community education, suspect identification, referral, DOT and default retrieval. To a variable extent nutritional, financial and social support is provided by various organizations depending on the mandate and funding availability. IEC materials (pamphlets and posters) have been developed and are widely available. Three of the four review teams found an extensive variety of materials and adequate availability at various facilities visited. The pamphlets are used for health education and distribution by community volunteers during their sessions in the community. Some of the materials also include hand-held fans, hand towels with messages, etc.

Challenges

A wide variation in implementation of community-based activities by different agencies was observed. These include availability of nutritional, social and/or financial support for patients, organization of services and payment to volunteers. Therefore there is lack of uniformity and clear direction for scale-up of ACSM activities.

ACSM activities are currently mostly limited to health education. There are very few advocacy activities and community mobilization appears to be mostly a passive by-product of other activities. Even in health education there is a limited effort by BHS in health education which could also be attributed to the high workload and limited communication skills while engaging with communities and patients.

The review mission felt that there is a suboptimal focus on marginalized and vulnerable population groups. Various population groups exist in various areas of the country. These include migrant workers (both internal and from outside the country), factory workers (specifically cement factory), prisons and populations in border areas. Moreover, people being treated in defence hospitals may not be accessing regular TB care services. Though the programme has ensured that TB control services are available as part of its regular service, no special efforts were observed by the review team to specifically find TB cases in such populations.

Since most of the educational material is available as printed literature, there is limited outreach of current efforts due to there being several dialects/languages, as well as issues with remote areas and security. Moreover, the materials tend to include a plethora of messages on all aspects of TB and transmission, some of which may not be of direct relevance for the community members, hence losing their focus.

Recommendations

11.1. Develop national ACSM strategy and plan addressing the identified gaps, streamlining all activities and defining roles. ACSM should be used as strategy to support all programme activities. Identified gaps such as resource mobilization, improving case notification, treatment adherence and using community resources to supplement health systems requirements can all be filled through targeted activities implemented under an ACSM strategy. Having a strategy will also help in streamlining activities being undertaken by the NTP and various agencies working in the country. As part of the strategy, mechanisms and tools to measure improvement in quality of services may also be developed. This is essential specifically to measure the contributions of community-based organizations where the activities may not immediately translate into direct changes in programme performance indicators.

11.2. Develop and implement focussed health education campaigns for various groups of marginalized and vulnerable populations. Different groups may have different needs and limitations in access to health services. Targeted

campaigns would therefore achieve greater outreach and acceptance, increasing the chances of the desired outcomes. Adopt IEC materials in various local languages to improve outreach of health education activities. The materials may also be pre-tested among community members to ascertain their efficacy.

11.3. Involve other community-based groups, including those working with HIV positive populations. This will help not only in improving case notifications but in addressing TB/HIV co-infection through early detection and improved treatment adherence.

11.4. Focus on developing communication skills of BHS and community volunteers during training on community guidelines. This may be done using role plays, practical demonstrations and other similar activities which provide a real life simulation.

11.5. Community participation in programme monitoring and review should be encouraged. This would help programme managers at various levels to get direct feedback on the quality of services being provided, including accessibility issues that are seen as the most common challenge to current efforts for scaling up case notifications. It should be ensured that the outcomes of such meetings feed into policy and planning decisions.

12. Health system strengthening

Achievements

The TB programme is an important part of, and well integrated into, the general health system. Health system strengthening efforts are cross-cutting and part of the implementation of all components of the Stop TB Strategy, as well as cross-cutting with other programmes and interventions. This section of the report describes selected aspects of the health system strengthening efforts, while other aspects are described in detail under the respective sections, such as the laboratory system, drug management, PPM, human resource development, infection control and financing and resource mobilization.

- The National Health Plan 2011-2016 forms an integral part of the National Development Plan with the aim of achieving the health-related MDGs.
- Tuberculosis is well represented and described in the annual report of the Ministry of Health, "Health in Myanmar 2011".
- A new five-year National Strategic Plan for Tuberculosis Control 2011-2015 has been developed, as well as a draft "Expansion Plan for Diagnosis and Treatment of MDR-TB" (as a supplement to the national five-year plan).
- The NTP operates 14 state and regional TB centres headed by state/regional TB officers. There are 47

Table 3. Health facility development, 1988-1989 and 2006-1011

Health facilities (number)	1988-1989	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Government Hospitals	631	832	839	846	871	924
Primary and Secondary Health Centres	64	86	86	86	86	86
Maternal and Child Health Centres	348	348	348	348	348	348
Rural Health Centres	1337	1463	1473	1481	1504	1558
School Health Teams	80	80	80	80	80	80
Traditional Medicine Hospitals	2	14	14	14	14	14
Traditional Medicine Clinics	89	237	237	237	237	237

Source: Health in Myanmar 2011, Ministry of Health (www.moh.gov.mm)

TB teams in the 64 districts and 54 TB teams in 263 townships.
- TB control services are functioning well in integrated townships visited during the mission.
- Possibilities for contacts between the community and the health system (as demonstrated by high immunization coverage rates).
- HR positions are steadily increasing by 5%-10% (depending on staff categories) per year.

Challenges

- Health service delivery is restricted by difficult terrain and communication in some parts of the country including challenges in border areas (internal and cross-border migration).
- Infrastructure constraints in general hamper many aspects of programme implementation.
- While the number of health facilities has increased in the period from 1988-1989 to 2010-2011, the major increase has been in number of hospitals as compared to other types of health centre (Table 3).
- There is suboptimal use of BHS contacts with the community, e.g. for immunization services, for health information and identification of TB suspects.
- While the number of BHS is inadequate compared to the staff time needed for all programmes and interventions (even if no vacancies existed), all health programmes/interventions rely on BHS for implementation of activities. This challenge will be further pronounced as intensified efforts will be needed following the findings of the TB prevalence survey.
- There is suboptimal use of village volunteers and other village-level informal care providers for TB control.
- There is suboptimal coordination between various components of the public sector (e.g. public hospitals and the NTP).
- There is limited coordination with other disease control programmes and interventions (e.g. MCH, GAVI Health System Strengthening activities) with regard to "demands" on BHS, especially midwives (see also HRD section), as well as strengthening of health service delivery in remote areas.
- There is suboptimal sharing of information between the NTP and partners.
- There are major constraints in staffing at all levels (see also HRD section).

Recommendations

12.1. Ensure adequate integration of TB control in the national health plans, with special attention paid to the needs for acceleration of activities based on the findings of the prevalence survey and the need to accelerate health facility development at health centre level and in rural areas.

12.2. Coordinate with other health programmes and interventions to provide services in difficult-to-reach areas. Ensure incorporation of (proactive) TB control activities into all mobile team work in difficult-to-reach areas.

12.3. Strengthen involvement of village volunteers.

12.4. Professional organizations and hospitals to organize regular dissemination and follow-up workshops on the International Standards for Tuberculosis Care for physicians, paediatricians and other specialists.

12.5. Strengthen coordination and collaboration with other health system activities such as GAVI Health System Strengthening activities and the upcoming 3 MDG Fund, including renovation and construction of health centres in remote areas and strengthening of management capacity at district and township level.

13. Infection control

Achievements

The NTP has identified infection control as an important issue to be addressed in the next phase of the TB control programme. Importantly, field visits found that many peripheral health staff were aware of the need for appropriate airborne infection control in the context of TB. In IHC project sites visited, airborne infection control was seriously incorporated into routine clinic policies and practices, with posters advising on cough hygiene, routine provision of masks to all clients, screening of clients at registration for TB symptoms, and administrative procedures to minimize crowding and lines in corridors.

Challenges

Very little has been accomplished on the normative and policy front, and there remains great scope for improvement. Efforts to address cough hygiene have been sporadic and lacked standardization. There was a

major opportunity over the past few years to improve airborne infection control awareness by joining with influenza-driven efforts, but as in most countries this integration opportunity was missed. Busy clinical services in Yangon were noted to be poorly ventilated relative to the client load. At IHC project sites, where the most attention has been given to airborne infection control, facility infection control plans were not in place. While adequate ventilation was available, systematic policies to open windows during clinic hours were not practised. TB symptom screening as designed and practised was relatively insensitive, with very few TB suspects identified and referred despite well-documented, systematic screening practices.

The major opportunity comes from the current willingness and interest of the NTP to seriously address and incorporate infection control into programme activities. The awareness of BHS on the risk of airborne transmission indicates a favourable environment for change. The great majority of public health facilities in rural areas rely on natural ventilation for climate control, which creates conditions favourable for minimizing airborne transmission, with minimal or no investment required. Most health-care facilities would just need awareness and management adjustments to further minimize risk of transmission. The larger health system efforts for pandemic influenza preparedness are underway, and should be joined rather than duplicated for TB purposes.

Recommendations

13.1. Develop and incorporate operational guidelines for airborne infection control into overall national infection control guidelines as part of overall health system strengthening (i.e. not TB-specific).

13.2. Develop a cadre of national consultants with expertise in airborne infection control capable of evaluating and making basic recommendations to health-care facilities. The cadre should be multidisciplinary, including public health, engineers/architects, and persons familiar with health facility management.

13.3. Incorporate basic infection control principles of cough hygiene, ventilation, and fast-tracking of respiratory symptomatics into trainings both for BHS and TB programme staff.

13.4. Prioritize the implementation of airborne infection control measures into HIV care settings (including settings with high HIV prevalence, such as STI care) and busy urban clinical care units, like medical colleges. It is crucial that measures not be limited to TB care settings, but rather be applied from the health facility perspective to common waiting areas and clinical care areas.

13.5. Involve NGO and private partners in the sensitization and capacity development process, so that they may apply these practices into clinical care settings operated beyond government health facilities.

14. Research

Achievements

The NTP and partners have recognized the important role of research, and the strengths of other agencies and institutions in promoting research. Notable efforts have been made by the Department of Medical Research (DMR), which undertook training on different aspects of research methodology for programme and partners in 2002, 2004, 2005 and 2007, with WHO and JICA support for different workshops. An annotated bibliography of TB research was published by DMR in 2008, full of rich and comprehensive detail on virtually all TB-related studies conducted in Myanmar, both formally published and in the grey area.

The NTP hosted a Workshop on Prioritization of Operational Research on TB in October 2009 in Nay Pyi Taw, with WHO, scientists from DMR, the University of Public Health and Medicine, and partner organizations. The workshop outputs, shown in Table 4, show the consensus at the time.

Since this workshop, Myanmar has completed a number of large-scale research and surveillance activities that have shifted the thinking around TB control and future research needs. As discussed elsewhere, the national disease prevalence survey has been completed, showing that there is more TB than previously expected and that accessing undiagnosed TB cases will require new case-finding strategies. National drug-resistance surveillance has shown a substantial burden of drug-resistant TB, yet the strategies for scaling up and integrating MDR-TB services remain to be finalized. In addition, several

Table 4. Outputs from Workshop on Prioritization of Operational Research on TB, October 2009

Challenges

- Dissemination and utilization of research findings at national level are not optimal to influence policy change or enhance evidence-based decision making.
- Coordination among academic institutions and 3 DMRs needs further improvement.
- Routine mechanism or regular forum to share information about ongoing research is necessary to avoid duplication of projects and to enhance collaboration.
- Numbers of articles to disseminate research findings in peer-reviewed international publications and local publications are also very limited.

Priorities

- Community involvement in case-finding
- Effect of providing adherence counselling and/or support for patients on anti-TB medications
- Combined treatment of MDR-TB with standard western drugs and traditional medicine
- Strengthening of TB/HIV collaborative activities
- Clients' satisfaction on DOTS
- Assessment of effects of GPs' participation on PPM/DOTS
- Role of family in TB/HIV co-infected patients (psychosocial, financial, prevention of MDR-TB and infection control)
- Contact tracing in areas with high case detection
- Effectiveness of training of BHS on DOTS
- Establishment of TB patient self-help groups

notable operational research projects on engaging the private sector, community mobilization, and TB/HIV collaboration have been conducted by programme staff and partners.

The National Strategic Plan for TB, 2011-2015, highlights further surveillance activities to be conducted, including:

- TB prevalence and mortality surveys in 2015 in order to measure progress towards achieving the MDGs.
- National drug-resistance surveys (first-line and second-line drugs among MDR cases) in 2013 and 2015, including HIV testing.
- Annual MDR-TB surveillance will be conducted from 2010 onwards in three townships bordering Thailand.
- TB/HIV annual sentinel surveys in 15 sites, expanding up to 40 sites at the end of 2015.
- KAP survey in 2013.

Challenges

First and foremost, surveillance findings have changed programme research priorities. The central challenge facing the Myanmar NTP is case-finding. The NTP has learned that many more TB cases are present in the community, but the traditional case-finding approach promoted by international guidelines is not likely to reach these cases. This challenge is more complex given the heterogeneity within the health system and across regions, which suggest multiple approaches will have to be developed, applied, evaluated and, if successful, incorporated into the programme. Substantial research capacity and knowledge will be required to guide this development and evaluation effort.

Second, no clear research agenda has been articulated to guide programme, partners, and researchers as to current programme priorities. While the 2009 DMR (Lower Myanmar) national consultation was a laudable effort, the programme's needs have evolved since then.

In practice, national consultations on research agenda tend to lead to a broad and unfocused set of priorities that treat all major and minor issues of TB control equally.

Third, research is minimally planned and budgeted for. The budget available in the National Strategic Plan 2011-2015 for research is quite modest (US$ 45 000 per year), but external funding (i.e. partners, donors, WHO) is usually not reflected.

Recommendations

14.1. Develop a priority research agenda, focused on the core programme challenge of case-finding. Ideas discussed during the mission are briefly summarized in Table 5.

14.2. Systematically direct OR efforts first towards interventions at scale for the urgent national challenge of TB case-finding. Follow the "do, evaluate, adjust and scale-up further" approach.

14.3. Identify academic partner(s) who can take responsibility for successful implementation of the priority research agenda.

14.4. Develop the capacity of programme staff and partners to conduct operational research. Utilize existing successful models of mentored capacity building projects, replicate in Myanmar.

Table 5. Possible operational research projects oriented towards improved case-finding

- Evaluation of approaches to engage informal providers and chemists, and the effectiveness in case-finding.
- Integration of simple TB information and screening into home-based outreach activities (e.g. immunization) to detect and screen chest symptomatics who have not yet sought health care.
- Effectiveness and cost-effectiveness of intensified TB case-finding efforts in groups with clinical or socioeconomic risk factors for TB.
- Evaluation of the effectiveness of broadly expanded symptom criteria eligibility for sputum examination, using existing tests, X-ray and newer diagnostics.
- General population screening (mass radiography) in high-prevalence areas: who to screen, how to screen, and what to do with persons who screen positive, including the possibility of preventative treatment for persons with X-ray abnormalities who are asymptomatic and without other evidence of active TB.
- Follow-up of detected TB cases from prevalence survey, to understand if patients detected through active community-based case-finding are successfully treated and rendered non-infectious by routine programme services.
- Evaluation of new diagnostic tools and approaches, including front-loaded sputum microscopy, two diagnostic smears, and new diagnostic tools such as cartridge-based nucleic acid amplification testing.
- Scaling up MMA collaboration with package of services for greater volumes and attractiveness for potential providers (e.g. TB-Malaria-Lung Health)

Annex 1: Review team members

International Participants		
Name	**Area of Expertise**	**Affiliation**
Ms Karin Bergstrom	Human resources, Health System Strengthening	WHO Headquarters
Dr Vineet Bhatia	ACSM	WHO Consultant
Dr Erwin Cooreman	General support	WHO Myanmar
Mr Jacob Creswell	Public-Private Mix	Stop TB Partnership
Dr Puneet Dewan	TB/HIV, Operational Research, Infection Control	WHO SEA Regional Office
Dr Cleotilde Hidalgo-How	Childhood TB	University of the Philippines
Dr Khurshid Hyder	Support to debriefing	WHO SEA Regional Office
Ms Nigor Muzafarova	Procurements and supply management	Global Drug Facility, Stop TB Partnership
Ms Eva Nathanson	General support	WHO Myanmar
Dr Paul Nunn	MDR-TB (TEAM LEADER)	WHO Headquarters
Dr Ikushi Onozaki	Epidemiology, case-finding, treatment and supervision	WHO Headquarters
Dr C.S. Paramasivan	Laboratory strengthening, diagnosis, new tools	FIND
National Participants		
Name	**Title**	**Affiliation**
Dr Saw Lwin	Deputy Director General	Department of Health
Dr Win Maung	Director	Department of Health
Dr Thandar Lwin	Deputy Director	National TB Programme
Dr Moe Zaw	Assistant Director	National TB Programme
Dr Si Thu Aung	Assistant Director	National TB Programme
Dr Win Win Mar	Assistant Director	National TB Programme
Dr Ko Ko Naing	Assistant Director	National AIDS Programme
Dr Tin Mi Mi Khaing	TB Officer, Lower Myanmar	National TB Programme
Dr Ohnmar Myint	Medical Officer	National TB Programme
Dr Myat Myat Moe	Epidemiologist	National TB Programme
Ms Thidar Nyein	Administrative Assistant	National TB Programme
Dr Myint San	Regional TB Officer, Bago	National TB Programme
Dr Win Naing	State TB Officer, Mon and Kayin	National TB Programme
Dr Aye Thein	Regional TB Officer, Sagaing	National TB Programme
Dr Thet Naing Maung	TB Project Manager	Myanmar Medical Association
Dr Ti Ti	Senior consultant	FIND
Dr Aung Thu	National Technical Officer	WHO Myanmar
Dr Bo Myint	National Technical Officer	WHO Myanmar
Dr La Win Maung	National Technical Officer	WHO Myanmar
Dr Myo Zaw	National Technical Officer	WHO Myanmar

Annex 2: Review programme and agendas of meetings on 7 and 15 November

Review programme

Date	Activity			
7 November	Welcome and briefing to the international review team			
	Meeting with technical and financial partners, Traders Hotel, Yangon			
FIELD VISITS	**Team I** Yangon Region	**Team II** Bago Region Mon State Kayin State	**Team III** Nay Pyi Taw Sagaing Region Mandalay Region	**Team IV** Shan State (south)
8 November	• Yangon Regional TB Centre • Central TB Drug Store • Lower Myanmar TB Drug Store • National TB Reference Laboratory • Aung San TB Hospital	• Waw township (Bago Region) • Thahton township	• Meetings at Ministry of Health and Department of Health • Pyinmana township	• Taunggyi State TB Centre • Saosanhtun Hospital
9 November	• MSF clinic, Hlaingtharyar township • Hlaing township	• Mon State TB Centre • Mudon township • IOM • PSI clinic	• Monywa tsp • Sagaing Regional TB Centre	• Hopone township • Kalaw district, Augban SHU
10 November	Report writing and transportation			
11 November	• North Okkalapar TB Centre • PSI clinic • New Yangon General Hospital	• Hpa-an district TB Centre • MMA clinics	• Mandalay Regional TB Centre • Mandalay TB and General Hospitals • Integrated Health Care project (Union) • Chanmyatharzi tsp	• Pindaya • Augban SHU
12 November	Feedback from field visits, National TB Programme, Nay Pyi Taw			
13 November	Plenary discussions on subcomponents of the programme, National TB Programme, Nay Pyi Taw			
	Dinner hosted by the Minister of Health			
14 November	Debriefing with the Minister of Health			
15 November	Debriefing with World Health Organization Representative			
	Debriefing with diplomatic and international community and UN agencies at Park Royal Hotel, Yangon			
	Debriefing at the Myanmar Country Coordination Committee, Ministry of Health, Nay Pyi Taw			

Agenda: 7 November meeting

Chairperson: Dr Win Maung, Director, Disease Control, Department of Health

Time	Topic	Presenter
Briefing for the review team (National TB Programme and WHO)		
08.00-08.10	*Welcome*	*WHO* *National TB Programme*
08.10-09.00	*Practical arrangement for the review*	*Dr Erwin Cooreman*

Session 1: Introduction to the review and overview of TB control in Myanmar (all participants)		
09.00-09.30	*Coffee/Tea Break*	
09.30-09.45	Welcome and opening remarks	Acting WHO Representative, Ministry of Health
09.45-10.00	Terms of reference and programme of the review	Dr Win Maung
10.00-10.15	Introduction of the international review team and all meeting participants	
10.15-11.00	TB in Myanmar: Epidemiology and Control	Dr Thandar Lwin
11.00-11.15	TB in Myanmar: Collaboration with technical and financial partners	Ms Eva Nathanson
11.15-12.00	Discussion on TB epidemiology and control	
12.00-13.00	*Lunch*	
Session 2: Partners' contribution to TB control in Myanmar		
13.00-13.35	**Involvement of private practitioners** Myanmar Medical Association Population Services International 10-minute presentation each, followed by 15-minute discussion	 Dr Thet Naing Maung Dr Phyu Phyu Swe
13.35-14.10	**TB/HIV and MDR-TB** Médecins sans Frontières – Holland The Union 10-minute presentation each, followed by 15-minute discussion	 Dr Khin Nyein Chan Dr Philippe Clevenbergh

14.10-15.00	**Roundtable discussion with partners supporting TB control efforts** Asian Harm Reduction Network Merlin Malteser Pact International Organization of Migration Myanmar Health Assistant Association World Vision 30-minute presentation by all partners (no PowerPoint slides) followed by 20-minute discussion	Dr Aung Yu Naing Dr Peter Wilson Ms Birke Herzbruch Ms Ei Ei Han Ms Mariko Tomiyama Mr U Aung Khin Dr Nay Htut Koko
15.00-15.30	*Coffee/Tea Break*	
Session 3: Financial support to TB control in Myanmar		
15.30-15.45	Past and future support by the Three Diseases Fund (European Commission and Governments of Australia, Denmark, the Netherlands, Norway, Sweden and the United Kingdom)	Mr Min Nwe Tun
15.45-16.00	Principal Recipients to the Global Fund to Fight AIDS, Tuberculosis and Malaria Round 9	Dr Faisal Mansoor, UNOPS Dr Esther Sedano, Save the children
16.00-16.10	Japan International Cooperation Agency	Dr Yoichi Yamadata
16.10-16.20	Yadana Consortium (TOTAL)	Daw Swe Swe Win
16.20-17.00	Discussion on financial support to TB control	
17.00-17.30	Closure of meeting and next steps	

Agenda: 15 November meeting

Chairperson: Dr Win Maung, Director, Disease Control, Department of Health

Time	Topic	Presenter
10.00-10.15	Opening remarks	Dr Win Maung, Director, Disease Control, Department of Health Dr H.S.B. Tennakoon, WHO Representative
10.00-10.45	Conclusions and recommendations from the review of TB control activities in Myanmar	Dr Paul Nunn, Coordinator, Stop TB Department, WHO
10.45-11.00	Feedback on the review debriefing with the Ministry of Health held on 14 November 2011 in Nay Pyi Taw	Dr Win Maung, Director, Disease Control, Department of Health
11.00-11.45	Open discussion	
11.45-12.00	Next steps and closing remarks	
12.00-13.00	*Lunch*	

Annex 3: People attending meetings and met during field visits

First Day Workshop, 7 November 2011, Traders Hotel, Yangon

Name	Title	Affiliation
Dr Aung Yu Naing	National Health Coordinator	AHRN
Dr Thet Tin Tun	Senior Technical Officer	Burnet Institute
Dr Win Maung	Director	Department of Health
Ms Nan Hom Nwet	Project Officer	DFID
Dr Julia Kemp	Health Adviser	DFID
Dr Saw Saw	Research Scientist	DMR (Lower Myanmar)
Dr Ti Ti	Consultant	FIND
Dr C.N. Paramasivan	Head of TB Laboratory	FIND
Dr Aye Aye Than	Health Coordinator	IOM
Ms Charlotte O'Sullivan	Health Programme advisor	IOM
Ms Mariko Tomiyama	Chief of Mission	IOM
Dr Yoichi Yamada	Chief Advisor	JICA
Dr G. Hkawn Nu	Medical Officer TB	JICA
Dr Aye Aye Thet	Country Health Coordinator	Malteser International
Ms Birke Herzbruch	Country Representative	Malteser International
Mr Peter Wilson	Country Health Director	Merlin
U Aung Khin	President	MHAA
Dr Min Ko Ko	Head of Office	MMCWA
Dr Hla Pe	Consultant	MRCS
Dr Khin Nyein Chan	Deputy Medical Coordinator	MSF - Holland
Dr Sein Sein Tin	TB Advisor	MSF - Holland
Dr Mathieu Bichet	Medical Coordinator	MSF - Switzerland
Dr Soe Aung	Director, Programme Management	Myanmar Medical Association
Dr Khin Swe Win	Technical Advisor	Myanmar Medical Association
Dr Thet Naing Maung	Project Manager	Myanmar Medical Association
Dr Ko Ko Naing	Assistant Director	National AIDS Programme
Dr Moe Zaw	Assistant Director	National TB Programme
Dr Si Thu Aung	Assistant Director	National TB Programme
Dr Ohnmar Myint	Medical Officer	National TB Programme
Dr Thandar Lwin	Deputy Director	National TB Programme
Dr Tin Mi Mi Khaing	Regional Officer	National TB Programme

Dr Khin Zaw Latt	Consultant	National TB Reference Laboratory
Dr Tin Tin Mar	Consultant	National TB Reference Laboratory
Ms Ei Ei Han	Programme Manager	Pact Myanmar
Dr Sun Tun	Research MIS Manager (M&E)	PSI
Dr Phyu Phyu Swe	Health Services Manager	PSI
Dr Esther Sedano	Deputy Director	Save the Children PR
Dr Myint Thu Lwin	Programme Manager	Save the Children PR
Mr Jacob Creswell	Technical Officer TB	Stop TB Partnership
Dr Min New Tun	Public health analyst	Three Diseases Fund
Ms Swe Swe Win	Head of socioeconomic sector	Total
Dr Sung Gang	Country Coordinator	UNAIDS
Dr Zaw Htoon Wing	Programme Manager	UNION
Dr Cleotilde Hidalgo-How	Childhood TB expert	University of Philippines
Dr Phyo San Win	M&E Officer TB	UNOPS
Dr Faisal Mansoor	Public Health Officer	UNOPS
Dr Khin Pa Pa Naing	Public Health Officer	UNOPS
Ms Karin Bergstrom	Scientist	WHO Headquarters
Dr Paul Nunn	Coordinator	WHO Headquarters
Dr Ikushi Onozaki	Medical Officer	WHO Headquarters
Dr Erwin Cooreman	Medical Officer TB	WHO Myanmar
Ms Eva Nathanson	Technical Officer TB	WHO Myanmar
Dr Aung Thu	National Technical Officer - TB Unit	WHO Myanmar
Dr Bo Myint	National Technical Officer - TB Unit	WHO Myanmar
Dr La Win Maung	National Technical Officer - TB Unit	WHO Myanmar
Dr Myo Zaw	National Technical Officer - TB Unit	WHO Myanmar
Ms Phavady Bollen	Technical Officer HIV	WHO Myanmar
Dr Puneet Dewan	Medical Officer TB	WHO SEA Regional Office
Ms Nigor Muzafrova	Technical Officer, GDF	WHO SEA Regional Office
Mr Chris Herink	National Director	World Vision
Dr Nay Htut Ko Ko	Health Specialist	World Vision
Dr Vineet Bhatia	Public Health Consultant	

Debriefing with the Minister of Health, 14 November 2011, Ministry of Health, Nay Pyi Taw

Name	Title	Affiliation
Professor Pe Thet Khin	Union Minister for Health	Ministry of Health
Dr Htun Naing Oo	Director General	Ministry of Health
Dr Than Zaw Myint	Director General	Ministry of Health
Dr Saw Lwin	Deputy Director General	Department of Health
Dr Win Maung	Director	Department of Health
Dr Thandar Lwin	Deputy Director	National TB Programme
Dr Moe Zaw	Assistant Director	National TB Programme
Dr Paul Nunn	Coordinator	WHO Headquarters
Ms Karin Bergstrom	Scientist	WHO Headquarters
Dr Ikushi Onozaki	Medical Officer	WHO Headquarters
Dr Puneet Dewan	Medical Officer TB	WHO SEA Regional Office
Ms Eva Nathanson	Technical Officer TB	WHO Myanmar
Dr Erwin Cooreman	Medical Officer TB	WHO Myanmar
Dr C.N. Paramasivan	Head of TB Laboratory Support	FIND
Dr Ti Ti	Consultant	FIND

Debriefing with diplomatic and international community and UN agencies, 15 November 2011, Park Royal Hotel, Yangon

Name	Title	Affiliation
Dr Aung Yu Naing	National Health Coordinator	AHRN
Ms Shaarti Sekhan	First Secretary	AusAid
Mr Karl Dorning	Country Representative	Burnet Institute
Dr Khaung Soy Ty	University Research Council	Cambodia
Dr Win Maung	Director	Department of Health
Dr Saw Saw	Research Scientist	DMR (Lower Myanmar)
Dr Ti Ti	Consultant	FIND
Dr C.N. Paramasivan	Head of Laboratory Support	FIND
Ms Isabella Mignucci	Humanitarian Coordinator	French Embassy
Dr Nana Tsanava	Health Delegate	IFRC
Dr Hiroyuki Nishiyama	TB Expert	JICA
Dr Aye Aye Thet	Country Health Coordinator	Malteser
Mr Peter Wilson	County Health Director	Merlin

Dr Hla Pe	Consultant	MRCS
Dr Khin Nyein Chan	Deputy Medical Coordinator	MSF-Holland
Dr Maria Guevara	Medical Coordinator	MSF-Holland
Dr Mathieu Brechet	Medical Officer	MSF-Switzerland
Ms Chan Mu Aye	Administration	Myanmar Health Assistant Association
Dr Tin Aye	Deputy Director, Programme Management Department	Myanmar Medical Association
Dr Khin Swe Win	Technical Advisor	Myanmar Medical Association
Dr Si Thu Aung	Assistant Director	National TB Programme
Dr Tin Mi Mi Khaing	Regional Officer	National TB Programme
Dr Tin Tin Mar	Consultant	National TB Programme
Dr Khin Zaw Latt	Consultant	National TB Reference Laboratory
Dr Wint Wint Nyunt	Microbiologist	National TB Reference Laboratory
Dr Sun Tun	Research Manager	PSI
Dr Aung Kyaw Lin	Deputy Director	PSI
Dr Myint Thu Lwin	Programme Manager TB	Save the Children
Dr Esther Sedano	Deputy Director	Save the Children
Mr Jacob Creswell	Technical Officer	Stop TB Partnerships
Mr Darin Kag	University Research Council	Thailand
Dr Aye Yu Soe	Public Health Officer	Three Diseases Fund
Dr Min Nwe Tun	Public Health Analyst	Three Diseases Fund
Dr Pietro Di Mattei	Head of Programme	Three Diseases Fund
Dr Cleotilde Hidalgo-How	Childhood TB expert	University of Philippines
Mr U Hla Phyu Chit	Project Support Officer	UNOPS
Dr Khin Pa Pa Naing	Public Health Officer	UNOPS
Dr Aye Aye Thwin	Director, Office of Public Health	USAID - Bangkok
Ms Carol Conragan	USAID	USAID
Dr Khin Khin Wint Aung	Senior Programme Assistant	WFP
Dr Paul Nunn	Coordinator	WHO Headquarters
Ms Karin Bergstrom	Scientist	WHO Headquarters
Dr Erwin Cooreman	Medical Officer	WHO Myanmar
Dr H.S.B. Tennakoon	WR	WHO Myanmar
Dr Myo Zaw	National Technical Officer	WHO Myanmar

Dr Bo Myint	National Technical Officer	WHO Myanmar
Dr La Win Maung	National Technical Officer	WHO Myanmar
Dr Aung Thu	National Technical Officer	WHO Myanmar
Dr Khurshid A. Hyder	Regional Advisor TB	WHO SEA Regional Office
Ms Nigor Muzafarova	GDF - Technical Officer	WHO SEA Regional Office
Dr Puneet Dewan	Medical Officer - TB	WHO SEA Regional Office
Dr Nay Htut Ko Ko	Health Specialist	World Vision
Dr Vineet Bhatia	Public Health Consultant	

Team I: Yangon: Places visited and persons met

Name	Title	Affiliation
Yangon Regional TB Centre		
Dr Tin Mi Mi Khaing	Regional TB Officer	National TB Programme
Dr Si Thu Aung	Assistant Director	National TB Programme
Dr San San Shein	TB Specialist	National TB Programme
Dr Saw Nwe Myint	Team Leader (East District)	National TB Programme
Dr Swe Swe Than	Team Leader (West District)	National TB Programme
Daw Naw Ester	District Health Nurse	National TB Programme
Daw Aye Aye Khaing	Staff Nurse	National TB Programme
Daw Naw He	Trained Nurse	National TB Programme
Daw Min Min Thin	Radiographer	National TB Programme
Daw Khin Aye Mu	Lab Technician Grade I	National TB Programme
Daw Naw Sae Khu Yin	Lab Technician Grade II	National TB Programme
Daw Khin Hnin Soe	Lab Technician Grade II	National TB Programme
Daw Anita	Lady Health Visitor	National TB Programme
Drug Store (Lower Myanmar)		
Dr Si Thu Aung	Assistant Director	National TB Programme
Dr San San Shein	TB Specialist	National TB Programme
Daw Aye Aye Khaing	Staff Nurse	National TB Programme
Drug Store (Aung San TB Hospital)		
Dr Khin Aye Myint	Medical Officer	National TB Programme
Dr Mya Thida	Medical Officer	National TB Programme
Daw Yin Sandar Moe' Moe' Tun	Pharmacist	National TB Programme
Daw Khin Nyunt	Sister	National TB Programme
Daw Aye Aye Win	Staff Nurse	National TB Programme
Din Win Kyin	Staff Nurse	National TB Programme
Ma San Tin	Trained Nurse	National TB Programme

National Tuberculosis Reference Laboratory		
Dr Ti Ti	Microbiologist	FIND
Dr Khin Zaw Latt	Consultant Microbiologist	National TB Programme
Dr Tin Tin Mar	Consultant Microbiologist	National TB Programme
Dr Wint Wint Nyunt	Microbiologist	National TB Programme
U Aung Min	Medical Technologist	National TB Programme
Daw Khin Khin Win	Medical Technologist	National TB Programme
Daw Ahmar Sein	Laboratory Technician Grade I	National TB Programme
Daw Ommar Aung	Laboratory Technician Grade I	National TB Programme
Daw Eh Khu Hser	Laboratory Technician Grade I	National TB Programme
Daw Win Win Yee	Laboratory Technician Grade I	National TB Programme
Aung San TB Hospital		
Dr Thandar Hmon	Medical Superintendent	Aung San Hospital
Dr Phyu No	Senior Physician	Aung San Hospital
Dr Tin Soe	Deputy Medical Superintendent	Aung San Hospital
Dr Khin Aye Myint	Medical Officer	Aung San Hospital
Dr Khin Aye Win	Medical Officer	Aung San Hospital
Dr Swe Swe Oo	Medical Officer	Aung San Hospital
Dr Zar Yar Lin	Medical Officer	Aung San Hospital
Dr Zar Ni Thaung	MDR-TB responsible Personnel	MSF-Holland
Dr Sein Sein Thi	TB/HIV Advisor	MSF-Holland
Hlaing Health Centre		
Dr Htay Htay Hlaing	Township Medical Officer	Hlaing Health Centre
Dr Min Khaing Thin	Assistant Surgeon	Hlaing Health Centre
Dr Ei Yar Han	Assistant Surgeon	Hlaing Health Centre
Dr Aye Thidar Latt	Assistant Surgeon	Hlaing Health Centre
Dr Thar Htet San	Dental Surgeon	Hlaing Health Centre
Daw Aye Aye Than	Township Health Nurse	Hlaing Health Centre
U Khin Maung Oo	TB Coordinator	Hlaing Health Centre
Daw Thin Thin Yee	Junior TB Worker	Hlaing Health Centre
Daw Nay Zar Win	Laboratory Technician I	Hlaing Health Centre
Drug Store (Hlaing Health Centre) Department Of Health		
Dr Htay Htay Hlaing	Township Medical Officer	Drug Store
Daw Aye Aye Than	Township Health Nurse	Drug Store
Daw Khin Hla Shwe	Lady Health Visitor	Drug Store
Daw Hnin Phyu	Lady Health Visitor	Drug Store
Daw Nilar Soe	Lady Health Visitor	Drug Store
Daw Sandar Lwin	Midwife	Drug Store
Daw Myint Kyi	Midwife	Drug Store

Daw Than Than Yee	Midwife	Drug Store
Daw Ei Kay Khaing	Midwife	Drug Store
Daw Aye Aye Khaing	Midwife	Drug Store
Daw Nilar Aung	Midwife	Drug Store
Daw Khin Swe Oo	Midwife	Drug Store
Daw Wai Wai Lwin	Midwife	Drug Store
Pharmacy (MSF- Holland)		
Khin Myo Lwin	Nurse in Charge	Pharmacy
Ms Mary Lwin	Dispenser	Pharmacy
Ms Chan Myae Soe	Dispenser Assistant	Pharmacy
MSF- Holland (HlaingTharyar Township)		
Dr Thin Thin Thwe	Project Medical Coordinator	MSF-Holland
Dr Sein Sein Thi	HIV/ TB Advisor	MSF-Holland
Dr Mya Thida	Clinic Manager	MSF-Holland
Dr Zar Ni Thaung	MDR TB Medical Responsible person	MSF-Holland
Ms Myo Htet Thu	Laboratory Supervisor	MSF-Holland
Ms Thein Thein Win	Nurse Supervisor	MSF-Holland
Private drug shop		
Ko Tun Win Aung	Owner, Tun Brother Drug Shop	Private drug shop
Daw Yu Yu Win	Owner, Ngwe La Win Drug Shop	Private drug shop
Laboratory		
Myo Htet Thu	Laboratory supervisor	MSF-Holland
Chan Myae Win	In-charge	MSF-Holland
Thi Thi Aye	Technician	MSF-Holland
Htet Htet Wai	Technician	MSF-Holland
Daw Nay Zar Win	Laboratory Technician I	Hlaing Health Centre
Daw Khin Aye Mu	Lab Technician Grade I	Yangon Regional TB Centre
Daw Naw Sae Khu Yin	Lab Technician Grade II	Yangon Regional TB Centre
Daw Khin Hnin Soe	Lab Technician Grade II	Yangon Regional TB Centre
Dr Ti Ti	Microbiologist	FIND
Dr Khin Zaw Latt	Consultant Microbiologist	NTRL, Yangon
Dr Tin Tin Mar	Consultant Microbiologist	NTRL
Dr Wint Wint Nyunt	Microbiologist	NTRL
U Aung Min	Medical Technologist	NTRL
Daw Khin Khin Win	Medical Technologist	NTRL
Daw Ahmar Sein	Laboratory Technician Grade I	NTRL
Daw Ommar Aung	Laboratory Technician Grade I	NTRL
Daw Eh Khu Hser	Laboratory Technician Grade I	NTRL

Daw Win Win Yee	Laboratory Technician Grade I	NTRL
Persons Interviewed		
33 TB and MDR-TB patients interviewed		
World Vision Self Help Group		
Dr Nay Htut Ko Ko	Health Specialist	World Vision
Daw Mar Mar Oo	Team Leader	
U Thein	Accompany patient to hospital or clinic	
Ko Kyaw Latt	Medicine supply	
Ma Thae Yu Zar Hlaing	Record keeper	
U Sun Tun	Accountant	
Daw Khin Myo Aye	Help in case detection	
U Pe Sae'	Gardener	
U Aung Kyaw Soe	Team Leader	
U Thein Soe	Accompany patient to hospital or clinic	
Daw Win	Accompany patient to hospital or clinic	
NTP Latha, TB diagnostic Centre and New Yangon General Hospital		
Dr Saw Saw	Research Scientist, Department of Medical Research	DMR – Lower Myanmar
Dr Daw Hla Kyin	Medical Superintendent	New Yangon General Hospital
Dr Tin Tin Yee	Deputy Medical Superintendent	New Yangon General Hospital
Daw Thwet Thwet Aye	Medical Social Worker	
Daw Saw Yu May	Matron	
Dr U Tin Linn	Pathologist	
Ms May Pwint Phyo	Medical Technician	
Ms Hnin Yee	Laboratory Technician Grade I	
Ms Yin May Oo	Laboratory Technician Grade I	
Ms Mya Mya Thwin	Laboratory Technician Grade II	
Two TB patients	TB patient	
Moe Moe Ei	Private Pharmacy in Hospital	
Ma San San Maw	Private Pharmacy in Hospital	
DOTS Centres, North Okkalarpa		
Dr Saw New New Myint	East Yangon District TB officer	National TB Programme
Dr Tin Tin Mar	Team leader, North Okkalarpa Township STD team	

Dr Ohnmar Sein	Township Medical Officer, North Okkalarpa Township	
Dr U Sein Win	Field Co-ordinatior	MMA
Dr Phyu Phyu Swe	Health Service Manager	PSI
Dr Su Su Zin	Health Service Officer	PSI
Daw Mi Mi Aye	Trained Nurse	
U Su Thaung	Laboratory Technician Grade I	
Daw Wah Wah Win	X-ray technician	
Four TB patients		
Interview		
Dr Hoke Shein	Tinsandar Clinic, Scheme III	PSI
Dr Kyaw Zaw	Aye Chan Thar Clinic, Scheme III	MMA
Dr Soe Naing	Pearl Clinic, Scheme I	MMA
Dr Aye Aye Mu	Htike Clinic, Scheme III	PSI

Team II: Bago Region and Mon and Kayin States, Places visited and persons met

Name	Title	Affiliation
Waw township health department and TB Centre, Bago Region		
Dr Myint San	Regional TB Officer	Bago Region
Dr Kyaw Soe	Medical Officer	Bago Region
Dr Zaw Win Naing	Township Medical Officer	Waw Township, Bago Region
Ms Khin Aye Maw	Township TB Team Leader	Waw Township, Bago Region
Ms Moe Moe Myint	Township TB Assistant Statistician	Waw Township, Bago Region
Mr Kyaw Naing	Laboratory Technician Grade II	Waw Township, Bago Region
Mr Hlaing Zaw Nyein	Junior TB Worker	Waw Township, Bago Region
Dr Myo Thein	National Technical Officer	WHO, Bago Region
Township MCWA members		
Dr Thet Naing Maung	Project Manager	MMA
Thaton district health department and TB Centre, Mon State		
Dr Win Naing	State TB Officer	Mon/Kayin States
Dr Tin Maung Nyunt	District Medical Officer	Thaton district, Mon State
Dr Ye Htut Aung	District TB Team Leader	Thaton district, Mon State
Ms Htike Dali Win	TB Sssistant Statistician	Thaton district, Mon State
Ms Khin Thida	Laboratory Technician Grade II	Thaton district, Mon State

Dr Thein Myint	National Technical Officer	WHO, Mon State
Maternal and Child Health Centre staff		
Lady Health Visitor and Midwives		
Township MCWA members		
TB patients		
Dr Thet Naing Maung	Project Manager	MMA
Mon State TB Centre, Mawlamyaing township		
Dr Win Naing	State TB Officer	Mon State TB Centre
Dr Thin Thin Yee	Medical Officer	Mon State TB Centre
Dr San Hla Phyu	Medical Officer	Mon State TB Centre
Mr Aung Mon	Health Assistant	Mon State TB Centre
Mr U Aye	Laboratory Technician Grade I, STLS	Mon State TB Centre
Yin Yin Soe	Laboratory Technician Grade II	Mon State TB Centre
Ms Khine Khine Thu	TB Assistant Statistician	Mon State TB Centre
Ms Ei Ei Chaw	TB Nurse	Mon State TB Centre
Ms Khin San Maw	TB Nurse	Mon State TB Centre
Ms Win Le Le Soe	TB Nurse	Mon State TB Centre
Ms San San Htwe	TB Assistant Statistician	Mon State TB Centre
Ms Khin Lay Tint	Compounder	Mon State TB Centre
Dr Thein Myint	National Technical Officer	WHO, Mon State
Ms Phu Pwint Aung	Data Assistant	WHO, Mon State
Midwives from Health Centres		
Township MCWA members		
TB patients		
Dr Thet Naing Maung	Project Manager	MMA
Mudon township health department and TB Centre, Mon state		
Dr Tin Htay	Township Medical Office	Mudon Township, Mon state
Dr Kan Htay	Medical Officer	Mudon Township, Mon state
Dr Hnin Myaing	Medical Officer	Mudon Township, Mon state
Dr Su Su Hlaing	Medical Officer	Mudon Township, Mon state
Mr Kyaw Htun	Township TB team leader	Mudon Township, Mon state
Ms Khin Win Htay	TB Nurse	Mudon Township, Mon state
Ms Than May	Laboratory Technician Grade I	Mudon Township, Mon state
Ms Su Su Mon	Laboratory Technician Grade II	Mudon Township, Mon state
Ms Moe Sandar	TB Assistant Statistician	Mudon Township, Mon state
MCH staff		

MCWA members		
TB Patients		
Mr Aye Htut	Project Manager, IOM	Mawlamyaing township, Mon State
Dr Zaw Win Maung	Medical Officer, IOM	Mawlamyaing township, Mon State
Dr Aung Hein	Health Services Manager	PSI
Dr Aung Kyaw San	Health Services Manager	PSI
Dr Nyan Nyein Chan Kyaw	Health Services Officer	PSI
Dr Thein Myint	National Technical Officer	WHO, Mon State
Taw Ku Village, IOM project area, Mudon township.		
Mr Aye Htut	Project Manager	IOM
Dr Zaw Win Maung	Medical Officer	IOM
Dr Phyo Wai Htun	Medical Officer	IOM
Ms Myat Kay Khine Soe	Township Community Project Assistant	IOM
Ms Aye Mi San	Outreach Health Worker	IOM, Taw Ku Village
Ms Hnin Wai Phyo	Outreach Health Worker	IOM, Taw Ku Village
Other 30 Outreach Health Workers		IOM, Mudon township
Ms Tin Tin Mar	Midwife	Taw Ku Sub-RHC, Taw Ku Village
Mr Tin Wai	Head of Village Tract Administration	Taw Ku Village
Village Mobility Working Group members		
Village MCWA members		
Village Influentials		

SUN Quality Health Care, PSI Clinic (Ka Bar Clinic), Mudon		
Dr Myint Oo	General Practitioner	Sun Quality Clinic
6 Auxiliary Clinic Nurses		
One TB patient (Category II)		
Dr Aung Hein	Health Services Manager	PSI
Dr Aung Kyaw San	Health Services Manager	PSI
Dr Nyan Nyein Chan Kyaw	Health Services Officer	PSI
Strand Hotel, Mawlamyaing township, Mon State		
Dr Aye Nyein	State Health Director	Mon State
Kayin State Health Department and District TB Centre, Pa-an township, Kayin State		
Dr Htay Naung	State Health Director	Kayin State
Dr Nay Winn Lynn	District TB Team Leader	Hpa-an district

Ms Nan Chaw Lay	TB Nurse	District TB team
Mr Khin Zaw Latt	TB Laboratory Technician Grade II	District TB team
Mr Aung Kyaw Thu	Public Health Supervisor Grade II	District TB team
Mr Zayar Min	TB Assistant Statistician.	District TB team
Ms Nan Su Mar Lay	Lady Health Visitor	MCH Centre, Pa-an
Ms Nan Khaing Zar Wint Nyein	Midwife	MCH Centre, Pa-an
Ms Nan Htwe Myint Thar	Midwife	MCH Centre, Pa-an
2 MMA-PPM Clinics, Hpa-an, Kayin State		
Dr Myint Soe	Township Coordinator	MMA-PPM, Pa-an township
Dr Thin Thin Win	General Practitioner	MMA-PPM Clinic, Pa-an
Dr Htay Htay Soe	General Practitioner	MMA-PPM Clinic, Pa-an
Dr Thet Naing Maung	Project Manager	MMA-TB, Yangon

Team III: Nay Pyi Taw, Sagaing and Mandalay Regions, Places visited and persons met

Name	Title	Affiliation
Ministry of Health, Nay Pyi Taw		
Dr Win Myint	Deputy Minister	Ministry of Health
Dr Saw Lwin	Deputy Director General	Department of Health
Dr Ko Ko Naing	Director	International Health Department
TB clinic and General Hospital, Pyinmana Township, Nay Pyi Taw		
Dr Khin Swe Win	Paediatrician	Acting Medical Superintendent
Dr Ni Ni Win	TB team leader	TB Clinic and General Hospital
Daw Hteik Hteik Htun	Township Health Nurse	TB Clinic and General Hospital
Daw Hnin Wint Hmon	Pharmacist	TB Clinic and General Hospital
Daw Kyaut Kay khine	Clerk	TB Clinic and General Hospital
U Nay Myo Htun	TB Laboratory Technician	TB Clinic and General Hospital
TB patients (4 adults and 4 children)		
NTP (Central), Disease Control complex, Nay Pyi Taw		
Dr. Win Win Mar	Assistant Director	NTP
Dr. Cho Cho San	Assistant Director	NTP
Dr. Tin Zar Naing	Medical Officer	NTP
Sagaing Regional Health Director Office, Monywa		
Dr Khin Maung Lin	Deputy Health Director	Sagaing Region

Sagaing Regional TB Officer office, Monywa		
Dr Aye Thein	Regional TB Officer	Sagaing Region
Dr Than Tun	Regional STD Officer	Sagaing Region
Dr Soe Maw	Physician	Monywa General Hospital
Dr Kyaw Shein	National Technical Officer	WHO, Sagaing Region
Dr Than Hteik	Medical Officer	IHC Project
Daw Khin Myo Tint	Health Assistant	Sagaing Region
Daw Naw Ju Baller Mue	Senior Nurse	Sagaing Region
Daw Aye Aye Than	Trained Nurse	Sagaing Region
U Ye San	Clerk	Sagaing Region
U Kyaw Myint Oo	Grade I Lab. Technician, Senior TB Laboratory Supervisor	Sagaing Region
U Tin Naing Tun	Grade II Lab. Technician	Sagaing Region
Daw Sabei	Clerk	Sagaing Region
U Wunna Swe	Junior TB Worker	Sagaing Region
Daw Sein Sein Win	Data Assistant	WHO, Sagaing Region
Monywa General Hospital		
Dr Khin Aye Mon	Pediatrician	Monywa General Hospital
TB patients (3 adults and 2 children)		
Mandalay Regional office		
Dr Khin Maung Tun	Regional Health Director	Mandalay Region
Dr Than Than Myint	Deputy Health Director	Mandalay Region
Dr Kyaw Soe	Regional Officer	National AIDS Programme
Dr Zaw Lin	Regional Officer	Malaria Control Programme
Upper Myanmar TB Centre, Patheingyi, Mandalay		
Dr Thandar Thwin	TB Specialist	Upper Myanmar TB Centre
Dr Thin Thin Ngwe	Medical Officer	Upper Myanmar TB Centre
Dr Thin Lae Swe	Microbiologist	Upper Myanmar TB Centre
Dr Tin Tin Latt	Microbiologist	WHO, Upper Myanmar TB Centre
Dr Yee Yee Myint	National Technical Officer	WHO, Mandalay Region
Lab technicians & other office staff from Upper Myanmar TB Centre		
Patheingyi TB Hospital, Patheingyi, Mandalay		
Dr Kyi Kyi Khaing	Medical Superintendent	Patheingyi TB Hospital
Dr Yu Yu Wai	Deputy Medical Superintendent	Patheingyi TB Hospital

Dr Sai Phone Kyaw	Physician	Patheingyi TB Hospital
Mandalay TB OPD, Mandalay General Hospital compound		
Dr Ngu Wah	Medical Officer	
UNION IHC project clinic, Mandalay General Hospital compound.		
Dr Philip Cleevenberg	Health of Officer	UNION
Dr Sai Ko Ko Zaw		UNION
Chanmyatharzi township, Mandalay		
Dr Daw Tin Htar	Township Medical Officer	Chanmyatharzi Township Hospital
Lab. technicians and TB coordinator trained nurse (Chanmyatharzi township, Mandalay)		

Team IV: Shan State, Places visited and persons met

Name	Title	Affiliation
State Health Centre		
Dr Myint Aung	State Health Director	Shan State (Taunggyi)
Sao San Tun General Hospital, Taunggyi		
Dr Tint Shun	Medical Superintendant	Sao San Tun General Hospital
Dr Khin Maung Yin	State HIV/AIDS, STC Officer	Shan State (Taunggyi)
Dr Aung Kyaw Myint	National Technical Officer	WHO, Shan South
Dr Su Myat Lwin	Field Project Officer	WHO (AIDS)
Dr Kyi Soe	UNION, IHC+ Coordinator	Sao San Tun General Hospital
Dr Su Hlaing Htwe	Medical Officer, IHC+	UNION
State TB Office, Shan State (Taunggyi)		
Dr Zaw Myint	State TB Officer	State TB Office
Daw Htay Htay Wai	Radiographer	State TB Office
U Khin Maung Lay	Lab. Grade I	State TB Office
U Tayzar	Lab. Grade II	State TB Office
Daw War War Oo	Lab. Grade II	State TB Office
Daw Nant Lai Par	Township Nurse	State TB Office
Daw M Nan Lar	Upper Division Clerk	State TB Office
Daw Thida Aye	Lower Division Clerk	State TB Office
U San Htay	Junior TB Worker	State TB Office
Pindaya Township		
Dr Than Min Htut	Township Medical Officer	Pindaya Township

Daw Khin Thida San	Staff Nurse, TB Coordinator	Pindaya Township
Daw Nay Chi Win	Trained Nurse, Laboratory	Pindaya Township
Daw Cho The	Midwife	Pindaya Township
Daw Khin Ohn Myint	Midwife MCH	Pindaya Township
Daw Pan Ei Shwe	Midwife MCH	Pindaya Township
Daw Tin Myint Maw	Compounder	Pindaya Township
Aung Ban Stational Hospital		
Dr Kaung Myat	State Medical Officer	Aung Ban Stational Hospital
Daw Khin Hnin Wai	Township Health Nurse	Kalaw General Hospital
Daw Nan Mya Aye	Health Assistant Team Leader	Kalaw Township
U Khin Zaw Tun	Public Health Supervisor I	Aung Ban Stational Health Unit
U Kyaw Tun Naing	Lab Technician, Grade II	Aung Ban Stational Health Unit
Daw Naw Saw Thein	Lady Health Visitor, MCH	Aung Ban Stational Health Unit
Daw Khin Maw Htwe	Midwife MCH	Aung Ban Stational Health Unit
Daw Yin Yin Nwe	Midwife MCH	Aung Ban Stational Health Unit
Daw Nan Moe Thuzar	Midwife MCH	Aung Ban Stational Health Unit
Hopone Township Health Centre		
Dr Hnin Ei Phyu	Acting Township Medical Officer	Hopone Township Health Centre
Dr May Thinzar Myint	Assistant Sugeon	Hopone Township Health Centre
Daw Nan Htar Htar Swe	Township Health Nurse	Hopone Township Health Centre
Daw Than Than Htay	Compounder, X-ray	Hopone Township Health Centre
Daw Nan Ohn May	Lab. Grade II	Hopone Township Health Centre
Kalaw District Health Centre		
Dr Tin Myint	District Medical Officer	Kalaw District Health Centre
Daw Nan Mya Aye	Health Assistant, Team Leader (TB)	Kalaw District Health Centre
Daw Hnin Wai	Township Health Nurse	Kalaw District Health Centre
Daw Lwin Lwin Hlaing	Trained Nurse	Kalaw District Health Centre
Daw Yee Yee Aye	Lab Technician Grade II	Kalaw District Health Centre
Daw Tin Tin Htwe	Lab Technician Grade II	Kalaw District Health Centre

Annex 4: National media coverage

THE NEW LIGHT OF MYANMAR Tuesday, 15 November, 2011

Teaching for TB disease control on discussion

NAY PYI TAW, 14 Nov— Union Minister for Health Dr Pe Thet Khin held a discussion about ongoing tasks for TB disease control, matters related to adding knowledge on modernized treatment for TB disease in the courses for pre/post graduated, and giving educative talks on TB disease control with Tuberculosis Cooperation Coordinator Dr Paul Nunn of International TB Programme Review Mission and party from World Health Organization in Geneva, Switzerland at the Union Minister's office here this noon.

Also present at the call were Directors-General of the departments under the Ministry of Health, Deputy Directors-General and officials concerned.—*MNA*

Union Health Minister Dr Pe Thet Khin discusses with Tuberculosis Cooperation Coordinator Dr Paul Nunn of International TB Programme Review Mission on TB disease control measures.—MNA

Annex 5: Photos from the review

Meeting on TB epidemiology and control with all technical and financial partners, 7 November 2011

Field visits, 8-11 November 2011

Debriefing with diplomatic and international community and UN agencies, 15 November 2011