Fifth Joint Monitoring Mission of the Bangladesh National Tuberculosis Control Programme

2-12 October 2010

World Health Organization
Country Office for Bangladesh

BAN-TUB-45
Distribution: General

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Printed in India

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Annexes

Acronyms

ACSM	advocacy, communication and social mobilization
AIDS	Acquired immunodeficiency syndrome
BGMEA	Bangladesh Garments Manufacturers and Exporters Association
BIRDEM	Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders
BSSMU	Bangladesh Sheikh Mujib Medical University
CDC	chest disease clinic
CMSD	Central Medical Store Depot
CPC	Cethylpyridinium chloride
DGHS	Directorate General of Health Services
DOT	directly observed treatment
DST	drug susceptibility testing
EQA	external quality assessment
FDA	Fluorescein diacetate
FDC	fixed-dose combination
GDF	Global Drug Facility
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GLC	Green Light Committee
HIV	Human immunodeficiency virus
HNPSP	Health, Nutrition and Population Sector Programme
HRD	human resources development
ICDDR,B	International Centre for Diarrhoeal Disease Research, Bangladesh

ICT	Immunochromatography assay
IEDCR	Institute for Epidemiology, Disease Control and Research
IT	information technology
LED	light-emitting diode
MBDC	Mycobacterial Disease Control
MDG	Millennium Development Goal
MDR-TB	Multidrug-resistant tuberculosis
MoF	Ministry of Finance
MoH&FW	Ministry of Health and Family Welfare
MoLGRD&C	Ministry of Local Government, Rural Development and Cooperatives
MoU	Memorandum of Understanding
MTB	Mycobacterium tuberculosis
M&E	monitoring and evaluation
NASP	National AIDS and STI Programme
NATAB	National Anti-Tuberculosis Association of Bangladesh
NGO	nongovernmental organization
NIPSOM	National Institute for Preventive and Social Medicine
NTP	National Tuberculosis Control Programme
NIDCH	National Institute of Diseases of Chest and Hospital
NTRL	National Tuberculosis Reference Laboratory
OPD	outpatient department
OR	operational research
PMDT	Programmatic management of drug-resistant tuberculosis
PPM	Public–private mix
SOP	standard operating procedure
SRL	supranational reference laboratory
TB	tuberculosis

TB IC	Tuberculosis infection control
TLCA	Tuberculosis and Leprosy Control Assistant
UHC	*Upazila* health complex
UH&FPO	*Upazila* Health and Family Planning Officer
VCT	Voluntary counselling and testing
WHO	World Health Organization
XDR-TB	Extensively drug-resistant tuberculosis

Executive summary

This report provides the findings and recommendations of the fifth review of the National Tuberculosis Control Programme (NTP) of Bangladesh, conducted on 2-12 October 2010. This joint monitoring mission evaluated programme performance since the fourth review held in 2007. Recommendations are related to the implementation of the Stop TB strategy during the period 2011-2013 aiming at achieving the Millennium Development Goals (MDGs) by 2015.

Tuberculosis (TB) remains a major public health problem in Bangladesh. The World Health Organization (WHO) estimated that in 2008[1] there were approximately 660 000 TB cases in the country (range 420 000-980 000). The number of new cases occurring in 2008 was estimated at approximately 360 000 (range 290 000-430 000). Of these, approximately 170 000 were infectious cases transmitting TB in the community (range 140 000-210 000). It was further estimated by WHO that about 79 000 TB patients, most of them not registered, had died of TB in 2008 (range 31 000-150 000).

General Observations

An important observation of the review is that a good opportunity exists to sustain the progress made in reducing the TB prevalence and mortality compared to 1990, for the following reasons: (i) the overall capacity and quality of DOTS (directly observed treatment, short course) implementation at field level is good; the commitment and contribution from implementing partners has been maintained; (ii) substantial external funding has been secured; the programme receives significant inputs from several external technical partners; (iii) new guidelines were adopted and plans prepared (e.g. on infection control, multidrug-resistant tuberculosis (MDR-TB) and public–private mix (PPM)) while capacity for implementation is being built in these

[1] http://www.who.int/tb/country/data/download/en/index.html, accessed on 31 October 2010

areas; and (iv) the national laboratory network and routine surveillance system has been strengthened.

Case-finding

In 2009, 160 735 TB cases were notified to NTP. Of these, 70% were classified as new smear-positive, 15% as new smear-negative and 12% as new extrapulmonary TB. The proportion of previously treated smear-positive cases was 3%. The proportions of smear-negative and retreatment cases were considered too low. The reviewers recommended implementing the following recommendations to increase the proportions of smear-negative and previously treated cases registered by the programme: (i) improve history-taking by field staff regarding previous TB treatment; and (ii) ensure that proper diagnostic procedures are applied to all smear-negative suspects according to NTP guidelines.

Childhood tuberculosis

Currently childhood TB is severely underdiagnosed. In order to increase case-finding of children with TB, the reviewers recommended that NTP ensure systematic screening and diagnosis for childhood TB.

Laboratory network

With regard to the laboratory network the reviewers observed that quality assurance for smear microscopy in most areas is suboptimal, that supervision by the national level is insufficient and that light-emitting diode (LED) fluorescence microscopes are available but not used in most areas. The National Tuberculosis Reference Laboratory (NTRL), set up in the National Institute of Diseases of Chest and Hospital (NIDCH) in 2006-2007, is now fully functional. The team had the following recommendations to address these weaknesses: (i) implement the revised WHO guidelines for external quality assurance (EQA) for smear microscopy; (ii) implement countrywide supervision and monitoring of the laboratory network; and (iii) strengthen the capacity of regional reference laboratories for implementing the laboratory expansion plan.

Treatment and directly observed treatment (DOT)

The NTP started approximately 300 000 new smear-positive TB cases on short-course chemotherapy during 2005-2007. The overall treatment success rate in these patients was 92%, surpassing the WHO target. Lower success rates were, however, observed in cases treated in metropolitan city areas and by chest disease clinics (CDCs). The NTP does not routinely analyse the treatment outcomes of all retreatment cases, relapse, failures and returning cases after default. Finally, the field visits revealed that DOT in some areas was insufficiently adhered to. To address these issues the team recommended implementing the following measures: (i) ensure that daily DOT is available at all locations, with particular focus on metropolitan city areas and CDCs; (ii) implement analysis of treatment outcome of relapses, failures and returning defaulters; and (iii) use the opportunity of the revitalization of community clinics to strengthen referral of TB suspects and DOT.

Supply of antituberculosis drugs

The review team noted with grave concern that NTP is at risk of serious drug shortages from November 2010 onwards. This risk is due to substantial delays in the procurement process itself as well as late submission of reports by the Principal Recipient, resulting in delays in the disbursement of funds from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). Additional concerns regard custom clearance delays and inadequate funds for procurement of drugs in 2009-2010. Stocks in hand on 30 September 2010 were only 0.3% and 2% respectively of the annual requirement of 4- fixed-dose combinations (FDCs) and 2-FDCs. The estimated budget for first-line TB drugs for the period 2011-2015 is approximately US$ 36 million, including a one-year buffer stock; 74% of this amount would be secured if the Round 10 proposal to GFATM were successful. This still would leave a gap of US$ 9.4 million to be financed from other sources.

The mission recommended that the Ministry of Health and Family Welfare (MoH&FW) implement most urgently the following measures: (i) initiate an emergency procurement of 6.5 million tablets of 4-FDCs for 2010; (ii) allocate adequate funding for buffer stocks in 2011-2012; (iii) secure sufficient government funds for custom clearance processes and

(iii) address immediately all interministerial/organizational bottlenecks related to customs clearance that were delaying delivery of drugs.

Programmatic management of drug-resistant tuberculosis (PMDT)

With regard to the current status of PMDT implementation, the mission observed that the planned expansion of PMDT has not been achieved and that the technical capacity for management of MDR-TB is insufficient. At present case-finding strategies are limited to failures of the retreatment regimen and case management is based on hospitalization in the intensive phase. Expansion of PMDT is further hampered by a shortage of second-line TB drugs and lack of appropriate infection control measures.

The reviewers recommended the following measures to accelerate PMDT expansion: (i) review the existing PMDT scale-up plan, taking into account the latest WHO recommendations and lessons learned from the site approved by the Green Light Committee (GLC) and the project led by Damien Foundation; (ii) build laboratory and programme capacity for scaling up PMDT; (iii) facilitate release of GFATM funds for procurement of MDR-TB drugs; and (iv) strengthen infection control at all levels through implementation of the existing (draft) infection control plan.

TB/HIV collaborative activities

Important findings of the review are that a NTP/National AIDS and STI Programme (NASP) Steering Committee exists and that TB/HIV collaborative guidelines have been developed. Collaboration between the two programmes, however, remained weak. In particular, in Dhaka the cross-referral mechanism and reporting and recording for NTP to voluntary counselling and testing (VCT) facilities for HIV and vice versa were weak. The mission recommended the following measures to enhance collaboration between the two programmes: (i) revitalize the TB/HIV Steering Committee and ensure regular meetings; (ii) disseminate and train staff on the use of TB/HIV guidelines; and (iii) strengthen the cross-referral system.

Advocacy, Communication and Social Mobilization (ACSM)

The NTP has developed an ACSM strategy and standard operating procedure (SOP) and established an ACSM Steering Committee. ACSM activities are

widely implemented. There is, however, little coordination and joint planning among implementing partners. The review observed that the ACSM capacity of NTP and implementing partners was still limited. The mission recommended taking the following measures to increase the impact of ACSM activities: (i) disseminate the ACSM strategy and SOP to all implementing partners; (ii) strengthen the platform for coordination and joint planning for ACSM activities by all implementing partners; and (iii) build capacity for ACSM at all levels.

Public–private mix

The main finding of the review was that the proportions of private doctors and pharmacists engaged in TB control were still limited. The NTP has not yet developed a national PPM implementation plan. Although PPM guidelines were available, they need to be updated. During the field visits it was observed that TB drugs were widely available in private pharmacies. In order to scale up PPM, the team recommended that NTP and nongovernmental organization (NGO) partners to develop and implement a national PPM plan.

Supervision, monitoring and evaluation

The review revealed that joint supervision by NTP and NGOs did not take place in many areas and that national planning, coordination and monitoring meetings of NTP and NGOs have not taken place during the past several months. Regarding the information system, the team noted that the planned electronic reporting system of district TB reports is not yet functioning, though the hardware had been made available for some years and staff had been trained. Furthermore, it was observed that the new reporting forms were not being used in many areas and that routine data were hardly used for corrective measures.

As supervision and monitoring and evaluation (M&E) are vital to assess and strengthen programme performance and quality, the following recommendations should be implemented with high priority: (i) NTP and NGOs should conduct joint supervision at all levels following a commonly agreed plan; (ii) under the leadership of NTP, national quarterly coordination, planning and monitoring meetings of NTP, NGOs and WHO should be re-instituted; and (iii) NTP should take immediate steps for implementing country-wide electronic compilation of reports at district level.

Human resource development

The main finding of the review was that the staffing of posts and positions for TB control was incomplete. Only five out of 21 GFATM-funded posts were filled at national level and only one division had a TB consultant. All facilities visited reported vacancies, some for up to eight years. The main recommendation for MoH&FW, in collaboration with NTP, was to take the necessary actions to fill vacant key positions at national, divisional and district level with well-trained and experienced staff.

Programme financing

The key finding was that NTP had secured substantial external funding for TB control since 2003 and that this was correlated with consolidation and growth of critical programme capacities. The total expenditures during the period 2007-2009 amounted to approximately US$ 39.2 million. It was, however, noted that the government contribution, with exclusion of salaries and infrastructure, was only 9%. It was further noted that delays in fulfilling GFATM preconditions have caused interruptions in disbursements, affecting programme activities and, critically, drug procurements.

The review team recommended that MoH&FW implement the following measures with urgency to avoid a breakdown of core programme activities: (i) immediately allocate funds to avert an imminent TB drug interruption in 2010 and ensure stability of first-line drug supplies for 2011; (ii) include adequate funds for TB drugs and activities in the next health sector plan; and (iii) secure funding for uninterrupted supplies of first-line drugs and critical diagnostic supplies.

National ownership and accountability

In view of the current situation the review team recommended the following measures to enhance national ownership of TB control at national level: (i) MoH&FW should formally endorse a national TB partnership with clearly articulated structure and functions, as a forum for joint programme development and accountability; and (ii) the national technical advisory group should support the national partnership.

Coordination and collaboration

The mission recommended the following measures to strengthen coordination and collaboration of NTP and its partners at all levels of the programme: (i) central NTP to review and re-align staffing responsibilities for additional focus on coordination, implementation and oversight functions for each division; (ii) develop joint action plans at district level for implementation and monitoring of activities together with all implementing partners; (iii) undertake district-level peer review missions together with designated staff from the central, divisional and district levels of NTP and partner agencies on a quarterly basis; and (iv) identify specific mechanisms for expanding the provision and monitoring of diagnosis and care, including successful models, through private sector providers and NGOs at the local level.

Overall conclusion

The programme has achieved commendable success in implementing and expanding the WHO-recommended Stop TB strategy during the past years and is currently providing diagnostic and treatment services for TB country-wide, including in the most remote *upazilas*. More recently, however, NTP has been facing serious problems with regard to programme management, human resources, supervision, coordination, financing, and drug procurement and supply. The programme is, therefore, at a crossroads. Strong policy advocacy, coordinated action with partners and allocation of necessary domestic resources will be critical to consolidate current achievements and make further progress. The NTP needs to prioritize, manage and steward the implementation of recommended interventions through a strong national partnership. Recent advances and policy recommendations of WHO on newer interventions in TB care and control and outcomes from research need to be used for further development of the programme in order to reach the 2015 MDG targets.

1. Introduction

Tuberculosis services began in 1965 in the country (then East Pakistan). Tuberculosis control was mainly curative and based in 44 TB clinics, 8 segregation hospitals and 4 TB hospitals. Services were expanded to 124 *upazila* health complexes (UHCs) during the Second Health and Population Project (1980-1986) under the Strengthening TB/Leprosy Control Services project and were operationally integrated with leprosy during the Third Health and Population Project (1986-1991) under the Mycobacterial Disease Control (MBDC) directorate. A study by the World Bank reported, however, that in 1990 less than 40% of the patients were completing their treatment and less than 10% of the estimated cases were detected in Bangladesh.

The revised NTP adopted the DOTS strategy beginning with the Fourth Population and Health Plan (1992-1998) under the Further Development of TB/Leprosy Control Services project. This five-year project had a budget of about US$ 14 million. WHO has been partnering in the execution of the project by providing technical assistance, training, selective procurement, monitoring and evaluation. The NTP started its field implementation in November 1993 in four pilot *upazilas* and progressively expanded to all 460 *upazilas* by June 1998. Since July 1998, NTP has operated under the Health and Population Sector Programme (1998-2003), integrated into the communicable disease control area of the Essential Service Package under the MoH&FW of Bangladesh. By January 2003, NTP coverage was 99%, including the metropolitan cities, while full coverage has been reported since 2007.

In March 2000, in Amsterdam, the highest health authorities of 20 high-TB burden countries signed an international "Call for Action" to achieve global targets by 2005. All countries, including Bangladesh, agreed to develop a national plan designed to identify needs and mobilize internal and external resources to accelerate DOTS expansion.

Five-year strategic plans were formulated for the periods 2001-2005, 2006-2010 and 2011-2015. The DOTS expansion also includes the corporate sector as well as prisons and health facilities of the uniformed services. Regional laboratories providing EQA services were established and PPM initiatives were piloted.

Tuberculosis control was given prominence in broader sectoral and multisectoral development frameworks including subsequent poverty reduction strategy papers and the sector-wide approach strategic documents: the current Health, Nutrition and Population Sector Programme (HNPSP) and the Health, Population Sector Strategic Plan (2011-2016, in planning).

The NTP continued its activities under MBDC under the Directorate General of Health Services (DGHS) of MoH&FW. The HNPSP emphasizes reducing severe malnutrition, high mortality and fertility, promoting a healthy lifestyle and reducing risk factors to human health from environmental, economic, social and behavioural causes, with a sharp focus on improving objectives by which the success of HNPSP is measured, including (i) reducing the maternal mortality rate; (ii) reducing the total fertility rate; (iii) reducing malnutrition; (iv) reducing infant under-five mortality; and (v) reducing the burden of TB and other diseases.

2. Goal and objectives of the fifth Joint Monitoring Mission

Goal

The overall goal of the Fifth Joint Monitoring Mission was to undertake a comprehensive appraisal of NTP and provide recommendations for strategizing and implementing essential activities to reach the MDGs, particularly the TB-related targets, by 2015.

Objectives

(1) To review the current NTP structure (including committees and partnership mechanisms), policies and procedures;

(2) To assess diagnostic procedures and management for all forms of TB (including childhood TB, smear-negative and extrapulmonary TB; regimens, DOT, referral mechanisms, etc.);

(3) To assess laboratory activities for TB control including smear microscopy, EQA, LED and culture and drug susceptibility testing (DST);

(4) To evaluate drug forecasting, procurement, storage, distribution and dispatch mechanisms;

(5) To assess recording, reporting, monitoring and evaluation procedures and use of data in programme management;

(6) To assess implementation of PMDT activities including infection control;

(7) To assess implementation of TB/HIV collaborative activities;

(8) To assess ACSM activities for TB;

(9) To assess the operational research (OR) mechanisms and projects undertaken for TB;

(10) To assess the relationship and linkages between NTP and the general health system;

(11) To assess human resources development (HRD) for delivering TB services; and

(12) To assess the financial resources for programme implementation and mechanisms for fund disbursement.

Methodology

The Joint Monitoring Mission took place with the full support of MoH&FW. 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 departments of MoH&FW. The international reviewers were experts in TB control or public health (Annex 1).

A Review Committee was set up, headed by the Director MBDC and Line Director (TB-Leprosy). There were three subcommittees: (i) budget, programme and schedules; (ii) logistics (tours and visits, accommodation, transport and communication): and (iii) documents and technical presentations and papers. The Review Committee provided overall guidance, facilitated the review planning process and finalized the plan of action for the review.

The review included six 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 districts and some central-level facilities were pre-selected and assigned to the teams. Within a district it was left at the discretion of the Team Leader to decide on the *upazilas* and facilities to be visited. The teams could observe delivery of NTP services and talk to policy-makers, health managers, medical officers, health workers, private physicians, TB patients and members of the community. After returning from the field sites, the team rapporteurs presented the findings of the team during a plenary meeting of the reviewers. The review programme is provided in Annex 2. A list of places visited and people met is in Annex 3.

Technical discussions took place on the last two days of the review. Debriefing of senior government officials took place during a special debriefing session on the last evening of the review.

3. NTP goal, objectives and structure

The vision of NTP is to eliminate TB as a public health problem from Bangladesh.

The mission of NTP is to strengthen TB control efforts through effective partnership, mobilizing resources and ensuring quality diagnostic and treatment services under defined DOTS strategy. The services should be equally available to all people irrespective of age, sex, religion, ethnicity, social status and race.

The overall goal of TB control is to reduce morbidity, mortality and transmission of TB until it is no longer a public health problem.

The objectives of NTP are to sustain the global targets of achieving at least 70% case detection and 85% treatment success among TB cases under DOTS, in order to then reach the interim target of halving TB deaths and prevalence and achieving the related MDGs by 2015.

The interventions proposed in the Strategic Plan for TB Control (2011-2015) towards achieving the set targets and the overall goal for TB control are grouped under the same six key elements of the global Stop TB strategy. These are:

- Pursue quality DOTS expansion and enhancement;
- Establish interventions to address HIV-associated TB and drug-resistant TB;
- Contribute to health systems strengthening;
- Forge partnerships to ensure equitable access to an essential standard of care for all TB patients;
- Engage people with TB and affected communities; and
- Promote OR.

The NTP is part of the MBDC directorate, which includes the permanent positions of Director, two deputy directors (one for TB and one for leprosy), two assistant directors (one for TB and one for leprosy) and one epidemiologist. The Director MBDC is also Line Director (TB-Leprosy), a function linked to HNPSP. The NTP is headed by the NTP Manager who is also Deputy Director and reports directly to the Director MBDC. The NTP is responsible for all planning, management and delivery of TB services. The MoH&FW also coordinates with other relevant ministries such as Finance (MoF); Local Government, Rural Development and Cooperatives (MoLGRD&C); Labour and Manpower; Education; and Social Welfare.

There are four Deputy Programme Managers who also report directly to the Line Director. They are in charge of the following areas: coordination; procurement and logistics; training; and administration and finance. All deputy programme managers have a medical background. Further, there are five medical officers who report to the Programme Manager and have been designated as focal points for specific programme components. There is fairly high turnover of staff occupying the latter positions.

There are no regular TB-specific posts at the divisional level. At the district level, the Civil Surgeon is formally in charge of the TB control

programme, and is assisted by a Medical Officer (Disease Control). In some districts he is assisted by a Programme Organizer (TB/leprosy). Junior consultants are in charge of the CDCs that are located in 44 districts. At the *upazila* level, the *Upazila* Health and Family Planning Officer (UH&FPO) is formally in charge and is assisted by the Medical Officer designated for disease control. All Government mid-level and field-level health staff have a formal responsibility for TB control. In city corporations, delivery of health services is the responsibility of the Chief Health Officer, who reports to the Mayor and whose activities are administratively overseen by MoLGRD&C. The six cities have their own health staff, though these are limited in number. Urban NGOs supplement service delivery in the cities. While the health staff of the city corporations are systematically involved in TB control activities, NTP has signed memoranda of understanding (MoUs) with two umbrella NGOs partnering with the city health authorities.

Additional support is provided through a network of national consultants and support staff funded by GFATM. A division-based consultant for TB is also assigned. At the time of the review, however, all but three consultant positions were vacant. Service delivery is much dependent on support from NGOs, including specialized TB NGOs as well as NGOs undertaking a broad range of health and development activities. While these partners are linked to NTP through various MoUs, either on an individual basis or through umbrella mechanisms, there is no formal or independent partnership.

Coordination mechanisms exist: they consist of formal committees, subcommittees and task forces with defined membership and terms of reference. Most of the committees are headed by the Director MBDC with the NTP Manager designated as Member Secretary. There is significant overlap in members between the committees. Meetings are held on a need basis but have tended to take place very irregularly or not at all in the past several months. A TB Technical Working Group is formally supporting the Country Coordination Mechanism of GFATM.

Recommendations

- Deputy Programme Managers and Medical Officers should be made the focal point for separate programme areas and made responsible and accountable for these particular areas.
- Each Deputy Programme Manager and Medical Officer should also be made the focal point for a particular division and act as a

liaison between the division-based consultant or health authorities within that division and NTP.

- The terms of reference and membership of the different committees, subcommittees and task forces need to be revisited in order to minimize duplication. It is advisable that different Member Secretaries are identified for each committee, subcommittee or task force.

4. Epidemiology and case notification trends

Estimated disease burden

To assess the exact TB burden in Bangladesh it is imperative to have representative epidemiological data of incidence, prevalence and mortality. With the exception of a prevalence survey conducted in 2009, no such data exist for the country. Therefore the following estimates were derived from the most recent published WHO estimates (2008)[2] (Table 1).

Table 1: *WHO estimates on TB in Bangladesh, 2008*

Parameter	Number of cases	Rate (per 100 000 population)	95% C.I. for rate (per 100 000 population)
Incidence rate (all cases)	360	220	180 - 270
Incidence rate (new smear-positive)	170	110	87 - 130
Prevalence rate (all cases)	660	660	420 - 980
Mortality rate (excluding HIV)	79	50	20 - 95
Proportion of adults (15-49 years) HIV positive	n. a.	0.1%	0 - 0.1%

Given the three-yearly reviews of the TB burden, a comparative analysis is made based on estimates from 1990 and 2008 (Table 2).

[2] Available at the following site: http://www.who.int/tb/country/data/download/en/index.html

Table 2: *Comparison of WHO estimates on TB in Bangladestableh between 1990 and 2008 (rates per 100 000 population)*

Parameter	1990 estimates	2008 estimates	Difference
Incidence rate (all cases)	220	220	-
Incidence rate (new smear-positive)	110	110	-
Prevalence rate (all cases)	550	410	–140
Mortality rate (excluding HIV)	62	50	–12

Table 2 compares the WHO estimates of the incidence, prevalence and mortality of TB for the years 1990 and 2008. Apparently the incidence has remained unchanged since 1990; the prevalence rate of all cases decreased with an average of 1.4% per year, while the mortality rate decreased by only 1.2% per year, on average.

On the condition that the data used for the comparison between 1990 and 2008 are unbiased and reflect the true population values, there is a high probability that Bangladesh will fail to achieve the WHO goals of halving the prevalence and mortality of TB by 2015 compared to the 1990 baseline.

With respect to the TB prevalence, NTP had commissioned a national TB prevalence survey which was conducted by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B).[3] Sputum of 52 098 persons of 15 years or older living in 40 clusters was examined. A total of 33 smear-positive TB cases were detected. The overall adjusted prevalence rate was determined at 79.4 per 100 000 adult population (95% confidence interval: 47.1-133.8). The prevalence rate was higher in rural than in urban areas, and also among men compared to women. The observed prevalence rate was lower than expected, and the confidence intervals are very wide. These point-estimates will have to be used carefully as the low estimate could very well be the result of sampling or methods used in case detection rather than a real decrease in prevalence. This uncertainty must be taken into account when the prevalence figure is used for planning and assessment purposes.

[3] Zaman K. Report of the Bangladesh nation-wide disease-cum-infection prevalence survey (2007-2009) (BAN-TUB-30)

Trends of notification rates

The trends of the notification rates for new smear-positive, new smear-negative and extrapulmonary TB cases as well as relapses at the national level showed four different patterns between 2001 and 2008 (Figure 1):

(1) The rates of the new smear-positive notifications increased moderately from 2001 till 2004, but steeply afterwards to reach the 70/100 000 level (which corresponded to the 70% detection target) and remained quite stable afterwards, just above the 70/100 000 level;

(2) the new smear-negative notification rates decreased from 2001 till 2004 and remained more or less stable afterwards;

(3) the extrapulmonary notification rates remained very low until 2004 but rose linearly afterwards; and

(4) the relapse rates remained low till 2004 (around 1/100 000) and increased since 2005 to 2/100 000.

Figure 1: ***Notification rate by type of disease, 2001-2008***

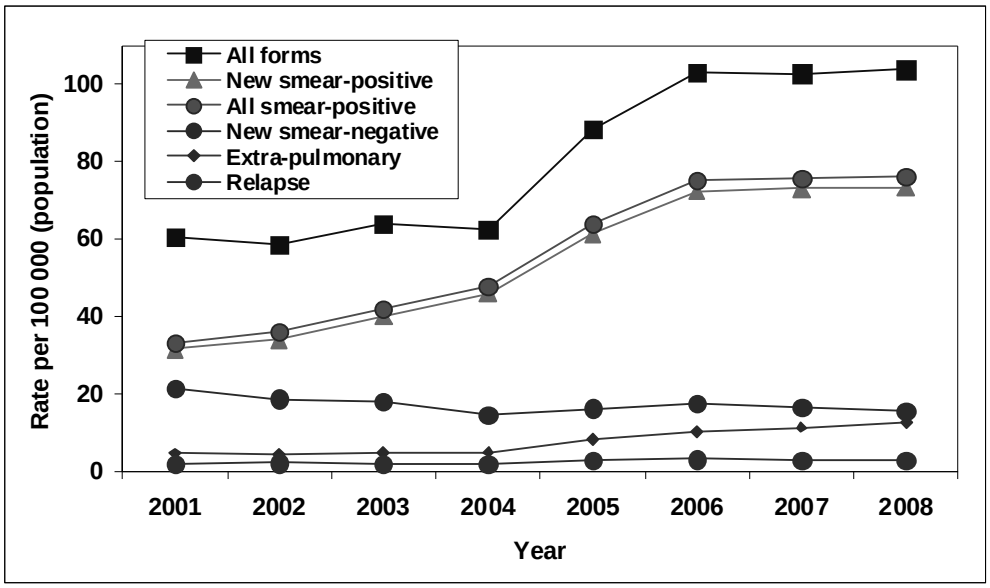
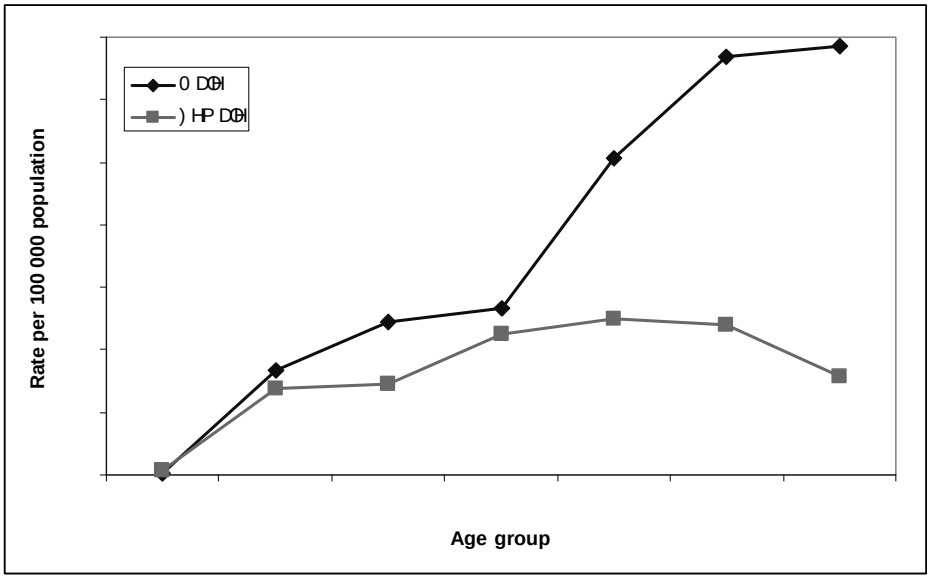


Figure 1: ***Age and sex specific notification rates for new smear-positive cases***

Of the 106 373 new smear-positive cases notified in 2008, 67% were males and 33% females. The male–female ratio was calculated at 2.02:1. The number of male new smear-positive cases was found to exceed the female ones in all age groups except in children (0-14 years of age). As shown in Figure 2, the male new smear-positive notification rates increased with age up to age 64 years; afterwards the rates remained almost stable. In female patients the rates increased until 45-54 years and decreased in older age groups.

Figure 2: ***Age- and sex-specific notification rates, new smear-positive cases, 2008***



5. Laboratory services, EQA and laboratory network

Quality-assured bacteriology including smear microscopy, culture and DST services is part of the Stop TB strategy. Microscopy services, totaling 1050, are well decentralized. Direct smear examination continued to receive the highest priority. Sputum culture and DST is the specific method for confirming the diagnosis of drug-resistant TB. There are three laboratories linked to NTP with the capacity to perform culture and DST: NTRL and the

Damien Foundation hospital laboratories in Netrakona and Mymensingh. The contamination rate in NTRL was 2-3% and the rate for smear-negative, culture-positive samples was 10% (while 20% tends to be more the norm).

First-line DST is conducted by solid Löwenstein-Jensen media as well as slide DST. The latter technique is also initiated in Rajshahi Regional Reference Laboratory. Identification of *Mycobacterium tuberculosis* (MTB) is done with nitrate reduction catalase test and *p*-nitrobenzoic acid.

The NTRL has cleared proficiency testing for first-line anti-TB with more than 90% agreement for rifampicin and isoniazid. It is in process for full accreditation.

The new technique of immunochromatography assay (ICT) would provide results for identification of MTB in five days while the currently used tests (niacin, nitrate reduction and catalase) take several weeks. Although LED fluorescence microscopes are available, they are only used in NTRL and in laboratories supported by Damien Foundation with a high workload.

The review teams found that the percentage of new sputum smear-positive pulmonary TB cases out of all investigated TB suspects was approximately 10%. In some settings, however, this percentage was as low as 3%, indicating incorrect identification of TB suspects and/or improper specimen collection or processing. The selection of TB suspects is also doubtful as evidenced by the high proportion of saliva in many laboratories.

Laboratory spaces were found to be adequate, with some exceptions. Good ventilation was also present for doing smear preparation. The new WHO recommendation of two samples for diagnosis has not been adopted. Three samples (spot-morning-spot) are still collected for diagnosis and one sample for follow-up. No regular maintenance has taken place of the Olympus CX-21 microscopes provided by NTP to many centres. Sputum is collected in the open air outside the laboratory. In some clinics the sputum is assessed macroscopically and a new sample requested if saliva is provided. Slides and sputum cups were provided in sufficient quantities. Due to stock-out of basic fuchsin, methylene blue and sulphuric acid, NGO partners have been procuring reagents locally. Their quality could not be ascertained. Laboratory personnel were also not wearing masks or gloves during smear preparation.

The results of EQA were quite good. Assessments were performed by the designated EQA supervisor in all microscopy centres. According to NTP guidelines, five slides per centre per month were sent for blinded rechecking by the first controller, located in the designated EQA laboratory. There was almost always consistency between the results of the peripheral laboratory and the first controller, even for scanty results, which may cast some doubts on the blinding. No errors were observed by the first controller in most centres visited; false results (including high false negative, low false negative and high false positive) occurred in only a few laboratories. It thus appears that the EQA system is unable to pick up errors, leading the review team to the conclusion that the quality assurance system for smear microscopy is functioning suboptimally in most areas. Power supply was cut for two to three hours per day and interrupted most activities in many settings.

Recommendations

- The revised WHO guidelines for EQA for smear microscopy should be implemented.
- Country-wide on-site supervision and monitoring of the laboratory network should be systematically undertaken, including laboratories supported by NGOs.
- Preparations should be made for introduction of new diagnostics tools (line probe assay, mycobacterial growth indicator tube, ICT and other molecular methods) at the national level.
- Biosafety at all culture and DST laboratories should be maintained as per the revised WHO guidelines. Personal protective equipment, especially N95 respirators, should be provided for all culture and DST laboratories.
- Expedite provision and installation of a generator for power backup.
- Use of the LED fluorescence microscopes in laboratories with a high workload and EQA laboratories should be implemented as soon as possible.
- The capacity of regional reference laboratories should be strengthened for implementing the laboratory expansion plan.

- The NTRL should strengthen the capacity of the regional reference laboratories by training their staff and conducting periodic supervision visits.
- Training or refresher courses should be arranged, especially for medical technologists who never smear and have no idea about the method of sputum smear examination.
- 1% cethylpyridinium chloride (CPC)–2% sodium chloride (NaCl) method should be expanded to laboratories that collect sputum for culture.
- NTP should ensure an uninterrupted supply of laboratory reagents and supplies.
- A microscope maintenance system should be established. Bio-engineering support for maintenance of equipment should be ensured.
- To further strengthen the EQA mechanism, it is recommended that blinded rechecking of slides by the first controller be strictly adhered to. In addition to all discordant slides, 3% of all slides from the first controller should also be randomly selected for rechecking by the second controller. The results of this exercise should be reviewed by the NTRL after six months.
- EQA feedback should be followed up with actions taken based on the recommendations.
- NTP should identify two more second controllers from NTRL to perform the additional work.
- The WHO recommendation of two sputum samples for diagnosis should be introduced.

6. Tuberculosis case-finding

In 2008, a total of 151 062 TB patients were reported in Bangladesh. Of these, 70.4% were new smear-positive, 2.7% retreatment cases, 14.7% new smear-negative pulmonary TB, and 12.2% extrapulmonary TB. The number of suspects who had a sputum smear examination increased substantially in the past five years, resulting in an increased number of smear-positive cases notified. The proportion of retreatment cases and smear-negative pulmonary

TB, however, remained relatively low. Childhood TB was rarely notified. Further, the quality of the diagnosis of smear-negative TB, childhood TB and extrapulmonary TB was rarely evaluated.

It was observed that the disease classification and patient type of cases in some UHCs was determined by the Tuberculosis and Leprosy Control Assistant (TLCA) or Programme Organizers who may not always have accurate information on the history of TB treatment, resulting in misclassification. Treatment after default and treatment after failure were also not consistently captured in quarterly reports. It is also observed that there was insufficient feedback for TB cases referred between UHCs and districts.

Although patients with smear-negative pulmonary TB are less contagious, smear-negative pulmonary TB still accounts for about 15-20% of transmission of TB in several communities. Therefore, a well-functioning NTP already efficient in the diagnosis and management of smear-positive TB should strengthen its capacity for detecting smear-negative TB. In general, diagnosis of smear-negative TB and extrapulmonary TB is more difficult and requires more sophisticated examination and training. Diagnosis of smear-negative TB is usually done by well-trained medical officers who are qualified in reading chest radiography. Overdiagnosis and underdiagnosis occur frequently among poorly trained personnel and should be avoided.

The low proportion of smear-negative TB among all cases is probably due to underdetection and incomplete notification of smear-negative TB. According to the flow chart for diagnosis and follow up of pulmonary TB of the NTP manual, a course (1-2 weeks) of antibiotics will be prescribed for smear-negative symptomatic suspects and chest X-ray will be taken for those who remain symptomatic after a course of antibiotics. However, smear-negative symptomatic suspects at sputum collection centres where there is no medical officer or medical assistant may not be prescribed antibiotics and may be lost to follow-up.

Some CDCs and most UHCs have no X-ray machine, have an X-ray machine that still needs to be installed, or have a functioning X-ray machine but no films or chemicals. Subsequently, smear-negative symptomatic suspects may be lost for follow-up without taking a chest X-ray. At some CDCs and UHCs with a functional X-ray machine, it was observed that fluoroquinolones were prescribed by medical officers or junior consultants for smear-negative symptomatic patients. Patients remaining symptomatic after a

course of antibiotics may not have a chest radiography, partly because a payment of about *taka* 70-100 is required. The quality of X-rays was also not consistent and a few chest X-rays reviewed by the monitoring team were found to be unsatisfactory. Medical officers were not well-trained in reading chest X-rays.

For suspects who are referred to specialists, there is no system for keeping track of arrival of suspects at specialist's clinic.

The NTP did not take into account that some cases reported as smear-negative TB were de-notified after their diagnosis was changed to non-TB.

Sputum culture may help identify smear-negative, culture-positive TB. However, the turnaround time for culture is considerably longer for smear-negative specimens, even for liquid culture. As a result, patients may seek health care at other health providers and start anti-TB treatment, or die, or be lost for follow-up before the results of the culture become available. While a culture is only useful for the diagnosis of TB and has no role in the management of other diseases, radiography is useful for the diagnosis and management of other lung diseases and conditions/illness of other organs. Ensuring quality-assured radiography should be part of the strategy for strengthening the health-care system.

Extrapulmonary TB is usually diagnosed by specialists at CDCs or hospitals. Most UHCs do not have the capacity to diagnose extrapulmonary TB. The number of patients with extrapulmonary TB notified to NTP has increased in the past five years. Possible factors for this include: (i) the change from intermittent to daily regimen (specialists indicated that the intermittent regimen recommended earlier by NTP was less efficacious); (ii) activities targeting specialists and private practitioners in notification of TB have significantly increased since 2004; and (iii) ongoing involvement of specialists and private practitioners in quarterly meetings about TB in some districts.

Recommendations

- History-taking on previous TB treatment should be meticulously undertaken for all patients.
- Proper classification by type of disease and patient type should be re-emphasized.

- All retreatment cases, including relapses, treatment after default and treatment after failure should be systematically reported quarterly.
- Collaboration between UHCs and NGOs should be strengthened to ensure registration and treatment of referral.
- A mechanism for quality assurance of X-ray reading should be implemented.
- Chest X-rays should be provided free-of-charge for smear-negative symptomatic TB suspects.
- All smear-negative symptomatic suspects at sputum collection sites should be sent to UHC for further management.
- Instead of one to two weeks, a one-week course of antibiotics should be prescribed for smear-negative symptomatic suspects. Fluoroquinolones should not be prescribed for TB suspects. Patients remaining symptomatic after such a course should be reassessed and an X-ray should be taken.
- Designated medical officers at UHCs should be trained in reading chest X-rays. In the absence of a trained medical officer, all smear-negative suspects with any abnormality on chest X-rays should be referred to a specialist for confirming the diagnosis of smear-negative TB.
- Patients properly diagnosed with smear-negative TB by specialists or private practitioners should also be notified to NTP.
- Reasons for de-notification of cases whose diagnosis was changed to non-TB should be routinely investigated.
- To strengthen the quality in the diagnosis and completeness of notification of extrapulmonary TB, NTP staff at all levels should be educated about extrapulmonary TB; be trained to identify suspects of extrapulmonary TB; and should refer extrapulmonary TB suspects to specialists for confirmation of the diagnosis.
- NTP should help strengthen the capacity of specialists at CDCs, chest disease hospitals, *sadar* hospitals and medical colleges in the diagnosis and treatment of extrapulmonary TB.

- NTP should continuously involve those specialists to ensure complete notification of patients with extrapulmonary TB; proper registration of extrapulmonary TB cases by site of disease; and regular follow-up and completion of treatment of extrapulmonary TB patients.

7. Treatment

Since 2004 all newly diagnosed TB patients are started on 2RHZE/4RH, regardless of the site and severity of disease. Patients with a history of treatment with anti-TB drugs for four weeks or more are started on 2SHRZE/1HRZE/5HRE.

Treatment results of new smear-positive cases started on treatment in 2006-2008 were made available to the review team. The total number of cases started on treatment in this period was 311 902. Of these cases, 90% were declared cured and 1% completed treatment without a smear examination result.

In 2008, 88% of the new smear-positive cases were treated at the *upazila* level, 10% in the six metropolitan cities and 2% by CDCs. Of the cohort registered in 2008, 7.2% of the cases treated in the *upazilas* had an unfavourable outcome (died, defaulted, failure or transfer out). The unfavourable outcome was 12.4% in cases managed in metropolitan cities and 16.8% in cases registered in CDCs. The default rates in *upazilas*, metropolitan cities and CDCs was, respectively, 1.5%, 3.5% and 7%. Of all cases started on treatment, 1923 (0.6%) failed treatment. In 1777 (0.6% of cases) the outcome of treatment was not reported.

According to the NTP manual, health staff or volunteers must observe the intake of all doses of anti-TB drugs by the patients. In the *upazilas*, drug intake of two-thirds of the patients is supposed to be done by health volunteers, and one-third by formal health staff. In addition to these, a variety of other health providers is used to ensure that DOT is followed. It was, however, noted in several areas that DOT is not strictly adhered to. It was reported that patients often receive weekly drug supplies for self-administration.

The NTP does not routinely report the results of treatment of relapses, failures and defaulters started on the retreatment regimen.

It can thus be concluded that overall the reported treatment results achieved by the programme are commendable, surpassing the global target of 85% cure. However, doubt exists about the very low proportion of failure cases identified. Concern exists also about the relatively high levels of unfavourable outcomes in metropolitan cities and CDCs, and about the quality and coverage of DOT. Lack of aggregate data regarding the outcome of treatment of retreatment cases is a shortcoming of the programme as these data are of particular importance in view of the PMDT expansion.

Recommendations

- To strengthen TB control in metropolitan cities by building partnerships between MOH&FW, MoLGRD&C, NTP, CDCs, City Corporation health services and relevant NGOs from 2011, onwards aiming at providing diagnosis and treatment for urban TB patients close to residence and workplace.
- To assess the quality of DOT by conducting an operational study in 2011 in a representative sample of patients in different settings, regarding patient experience and satisfaction with treatment delivery by field staff responsible for DOT.
- To implement routine reporting of case-finding and treatment results of previously treated cases by category (relapse, treatment after default, treatment after failure) by 2011.

8. Supervision, monitoring and evaluation

The NTP at central level does not have a written supervision plan. Supervision by NTP at national level was not routinely undertaken during the past one year. Surprise supervision visits were occasionally made by the UHC-based UH&FPO or district-based Medical Officer (Disease Control) or TLCA. These staff do not have transport facilities. The only divisional TB consultant currently in place (in Khulna) supervises districts and *upazilas* of this division. Supervision by the NGO partners of their own staff, according to a supervision plan, continued to take place in dialogue with the local health authorities. Joint supervision by NTP and NGOs does not take place in most

areas. NGOs reportedly use the supervision checklist. Copies of completed forms and written feedback, however, could only be provided to the reviewers in a few cases.

Copies of the case-finding and treatment outcome reports as well as the TB laboratory reports were available in most facilities. The new reporting forms were not yet used everywhere. NGOs, in collaboration with the Programme Organizer or TLCA in the Civil Surgeon office consolidate *upazila* reports manually into district reports. These summary reports are signed by the Civil Surgeon and forwarded to NTP central office together with the detailed *upazila* reports. A computer and printer for electronic compilation was provided to the CDCs two years ago. Computer operators have been trained. However, electronic district reports are not yet prepared.

Copies of EQA reports were available in all facilities visited. Quarterly EQA reports are prepared at the EQA laboratories and, through the NGO, submitted to NTP central level.

There is no feedback from NTP central office on inconsistencies, in-completeness, mistakes, etc. in reports. Routine data are apparently not used for corrective measures.

National quarterly coordination, planning and monitoring meetings of NTP, NGOs and WHO, which were instituted during 2003, have not taken place for more than one year.

Case finding and treatment outcome reports are discussed during the quarterly district monitoring meetings and quarterly or six-monthly *upazila* monitoring meetings, attended by government and NGO staff. Since about one year ago these meetings have not taken place. Minutes of these meetings were only occasionally available.

At *upazila* level, monthly meetings on health-related issues are held. TB is part of the agenda of these meetings which are also attended by NGO staff. Minutes of these could occasionally be shown.

Recommendations

- NTP and NGOs should develop and implement a plan for joint supervision at all levels.

- Under the leadership of NTP, national quarterly coordination, planning and monitoring meetings of NTP, NGOs and WHO should be re-instituted.
- NTP should take immediate steps to implement country-wide electronic compilation of districts reports.
- NTP should ensure that the new reporting forms are used in all areas.
- Central M&E staff should provide feedback on inconsistencies, incompleteness, etc. of routine reports.
- An internal review by NTP, NGOs and WHO should be undertaken annually, except during the year when there is a joint review.

9. Drugs and supply management

The central NTP unit is responsible for provision of first- and second-line anti-TB drugs as well as laboratory reagents and supplies to all the implementing partners for diagnosis and treatment of TB patients. Based on the programme needs and estimates the central NTP team quantifies the annual requirements, places local and international anti-TB drug orders and procures supplies, and ensures timely receipt and distribution of all supplies to the relevant health facilities.

The NTP shifted to the daily rifampicin-throughout regimen in 2008. The mission team observed that FDCs for adults and children were widely used and available in most of the facilities visited. The programme has also received two tranches of second-line drugs through GDF for treatment of MDR-TB patients approved by GLC at the NIDCH treatment site since 2009.

Quantification, procurement and distribution of laboratory reagents, supplies and essential equipments were handled by WHO office until 2008 and taken over by NTP afterwards. However, due to the limited procurement capacity of the central NTP team, an international procurement agency was hired as per the GFATM requirement in July 2010. This agency will expedite the procurement processes on behalf of NTP.

Over 95% of the programme needs in anti-TB drugs are procured internationally through GDF while only single formulations were purchased through the Central Medical Supplies Depot. This is the government's procurement agent and handles customs clearance processes, receipt, storage and distribution of all drugs and supplies and maintains several storerooms. The stores, however, are inadequately furnished and equipped, the space is limited, and good storage practices are not systematically in place. In addition to the existing storeroom in Shyamoli, NTP was able to secure a new large storage space in the newly constructed government hospital in Shyamoli. The GDF-supplied drugs and other imported supplies have been kept in these stores since 2009. These stores are well maintained, furnished and equipped. Six people (four regular government staff and two funded by GFATM) are currently posted at NTP stores. Only manual tracking of stock positions is currently taking place. Second-line drugs are kept at the NIDCH treatment site.

Despite the limited amount of drugs available at the central TB stores during the review, the mission team observed that "first expiry–first out" principles were not practiced during storage and perhaps issuing of drugs. The current stock position of all anti-TB drugs at the Shyamoli stores is provided in Table 3.

Table 3: *Stock position of anti-TB drugs, Central TB store*

Product	Annual requirement (excluding buffer stock)	Average monthly consumption	Stock in hand 30/09/2010
RHZE150/75/400/275 (tab)	31 212 000	201 000	103 040
RH150/75 (tab)	61 812 000	5 151 000	1 227 416
RHZ 60/30/150 (paed. tab)	1 301 160	108 430	0
RH 60/30 (paediatric tablet)	2 382 240	198 520	55 940
E400 (tab)	3 060 000	255 000	0
S 1 g (vial)	408 000	34 000	106 040

The above table clearly indicates an acute shortage of vital anti-TB drugs. This was also observed by the mission team in some of the facilities

visited, and has to be immediately addressed through domestic purchases of 4-FDCs and E400 mg tablets.

Substantial delays in customs clearance of vital drugs due to lack of funds (customs fee) over the last two to three years are also contributing to supply chain interruptions. In 2009-2010, the drugs have been kept in Chittagong sea port and Dhaka airports for 40 to 70 days while the programme suffers a shortage of drugs at various levels, and treatment for new patients has not been initiated in some of the facilities visited. Most of the visited health facilities reported shortages of vital drugs at some point during the last 12 months; however, all of them have confirmed that patient treatment was not interrupted.

The distribution from central to district level is organized through NGOs on a quarterly basis with limited supervision from the central NTP. The drugs and laboratory reagents are kept at NGO stores, which are adequately spaced, furnished and maintained. The few district-level government storerooms visited were very poorly maintained, had limited storage space and were inadequately furnished. All facilities visited, however, faced problems in accurately quantifying their needs, which led either to stock-outs or accumulation of expired and damaged drugs. Most of the facilities visited had problems in proper store management, while several had no updated stock records. At most of the facilities visited the mission observed expired and quality-compromised (E400) drugs. The staff did not know how to dispose of these items and expected advice from the central NTP. A waste management guideline does not exist or is not being used.

Training of district-level logistic focal points and monitoring and supervision of the supply management system is said to be the responsibility of the central NTP and the implementing partners. The ambiguity in roles and responsibilities of the involved agencies in the above-mentioned activities requires a very close and tight planning and coordination among all concerned. Streamlining of the roles and responsibilities of each agency in training and supervision is strongly desired and would help to improve the practices. The mission observed that very limited or no supervision has taken place in the last 12-15 months. Although several trainings were conducted since 2008, the positive impact of the training has yet to be observed. Roll-out of trainings to the district level has not taken place nor has been planned for.

A gradual reduction in domestic funding for procurement of both first- and second-line drugs and supplies has been observed over the last four to five years. The NTP has become solely dependant on external funding, making it very vulnerable to fluctuations in fund flows. Delays in submission of reports to GFATM have led to substantial delays in disbursement of funds and procurement of essential drugs and supplies. A global shortage of quality-assured streptomycin may further aggravate the situation by extending the lead time for procurement.

The NTP plans to continue procurement of anti-TB drugs through the GDF direct procurement mechanism with funding from GFATM. The GFATM Round 5 and Round 8 approved grant budgets have good amounts of funds earmarked for procurement of medicines and pharmaceutical products. These are, however, not sufficient to meet the programme needs (including restoring the buffer stock) given the change in market price. Additional funds were included in the Round 10 proposal, of which the outcome is yet to be announced.

Recommendations

The following sets of recommendations were made to further strengthen and improve the drugs and supply management practices:

- NTP through MoH&FW/MoF should initiate emergency procurement of 4-FDCs locally through government funds until the arrival of GDF drugs (6 500 000 tabs).
- NTP through MoH&FW/MoF should identify adequate additional funds for procurement of first-line drugs for 2011-2012 from government funds to stabilize the supply chain and to build up the required buffer stock.
- NTP through MoH/MoF should ensure provision of adequate funds for payment of custom duties (4% of the total value of internationally procured drugs from 2010 onwards).
- NTP should ensure timely submission of technical/financial reports to GFATM to avoid delays in fund disbursements for procurement purposes.

- NTP should ensure immediate distribution of current stock of 2- and 4-FDCs to all partners that have reported stock-outs or very low stock levels.
- A basic Excel spreadsheet should be initiated at the Shyamoli store for drug inventory, recording and reporting purposes until software is procured and staff trained in its use.
- NTP should urgently follow up the custom clearance process for 2-FDCs and other drugs provided by GDF from Dhaka airport.
- The drug distribution and consumption data should be closely monitored and analysed on a quarterly basis and corrective actions should be immediately taken if unusual practices are observed.
- An adequately trained and skilled pharmacist or Store Assistant should be assigned to Shyamoli NTP Store to adhere to good store management practices.
- Training on quantification, store management and inventory at *upazila* level for both government and NGO staff should be provided as soon as possible.
- NTP should ensure regular supportive supervision visits to government and NGO stores to improve store management practices at all levels.
- Expired or damaged drugs should be properly disposed of.
- Additional external funding should be sought to improve storage infrastructure of UHC storerooms.

10. Childhood tuberculosis

Childhood TB is fairly difficult to diagnose because it is usually bacteriologically (smear and culture) negative. Diagnosis of childhood TB is usually based on history of contact, symptoms and signs, X-ray and tuberculin skin test. Childhood TB is a neglected problem in Bangladesh. The total number of childhood TB cases was not reported in the country's 2009 annual report. Among new smear-positive cases, 0.8% were in the 0-14-year age group.

A childhood TB manual was in development during the period of the review and is expected to be completed before the end of the year. This will be followed by training of various cadres of health staff, including a five-day training of trainers course to build the training capacity of national experts, with abridged versions for paediatricians, medical officers and allied health workers.

As childhood TB commonly occurs in children with household contact of smear-positive pulmonary cases, contact tracing may help in identifying children suspected with TB.

Recommendations

- The TLCA should systematically conduct contact tracing of smear-positive TB patients to identify children who have household contact of smear-positive pulmonary cases.
- The TLCA should provide isoniazid preventive therapy to asymptomatic children according to national policy. NTP should consider revising its policy to include children below five years.
- Symptomatic children should immediately be referred to UHC for initial management.
- At the *upazila* level, medical officers who have not been trained in identification of childhood TB suspects or diagnosing TB in children should refer childhood TB suspects to pediatricians for confirmation of diagnosis.
- NTP should continuously involve paediatricians in notification of childhood TB.

11. Programmatic management of drug-resistant tuberculosis

Background

Bangladesh is among the 27 priority countries for MDR-TB and extensively drug-resistant tuberculosis (XDR-TB). On the basis of mathematical calculations, WHO estimated a MDR-TB rate of 2.2% in new cases and

14.7% in retreatment cases, corresponding to 9 800 MDR-TB patients per year. Based on the current case detection rate, NTP may need to treat an estimated 3 053 smear-positive MDR-TB patients. The first nationwide drug resistance survey, expected to be completed by mid-2011, is aimed at providing a more direct estimate of the resistance pattern in new and retreatment cases.

To address the MDR-TB problem, the country embarked on a GLC-approved pilot project at NIDCH. Enrolment of patients started in August 2008. The country has an operational manual for implementing this project wherein an MDR-TB suspect is defined as a Category 2 patient remaining positive at five months or more. There is a proposal to revise and expand this definition. This project follows a 24-month treatment regimen with an intensive phase varying from 6 to 9 months (kanamycin, cycloserine, ethionamide, ofloxacin and pyrazinamide) and a continuation phase (omitting kanamycin) of 18 months after culture conversion. The dosage is linked to body weight and patients are hospitalized during the intensive phase. The project is supported through Round 5 of GFATM, and scale-up is planned under Round 8.

In addition to the above pilot, a special project is being undertaken by the Damien Foundation in their designated project area (13 districts) and more recently expanded to all districts of Rajshahi Division. The project follows a defined protocol whereby MDR-TB suspect is defined as Category 1 patients remaining positive at three months or more, Category 2 patients remaining positive at four months or more, relapses of both Category 1 and 2, treatment after default and symptomatic contacts of MDR-TB patients. Follow-up cultures are done at monthly intervals during the intensive phase and every two months during the continuation phase. Treatment is with a shorter regimen of an intensive phase of four to seven months (kanamycin, prothionamide, high-dose isoniazid, clofazamine, gatifloxacin, pyrazinamide and ethambutol) and a continuation phase of five months (without kanamycin, prothionamide and isoniazid).

GLC-approved project

The NIDCH is a tertiary-level hospital for TB and chest diseases. It has 680 beds including 350 for TB, of which 80 are specifically allocated for MDR-TB. There is usually a spillover to the non-MDR-TB ward due to increased MDR-

TB patient load. At the time of the review, there were 108 MDR-TB patients hospitalized. The policy is to admit all chronic cases (80%), seriously ill MDR-TB suspects (15%) and confirmed MDR-TB (5%). There are about 20 patients to one staff nurse. The policy for discharge includes four negative cultures. The earliest discharge is after six months but generally patients are discharged after seven to eight months. The NTP ensures necessary preparations for ambulatory treatment (identification and training of DOT provider, drug supply to the field).

Suspects for MDR-TB (both public and private) are referred from all parts of the country with the exception of the Damien Foundation-supported areas. During hospitalization, the patient is under the care of one of the nine medicine units. Allocation to a unit is determined by the day of admission. The unit evaluates the patient and refers to the hospital's DOTS-Plus coordinator and his team for decision to treat. A DOTS-Plus Committee comprising about 15 persons is consulted for the management of serious adverse drug reactions, change of regimen and discharge. Pretreatment investigations include sputum examination, X-ray, complete blood count, glycemia, liver function test, kidney function test and HIV. Other tests such as pregnancy test, thyroid function tests and electrolytes are not routinely performed. Follow-up examinations only include sputum culture and smear on a monthly basis. Recording of monthly follow-up sputum examinations, however, is not done regularly on the treatment card.

A weekly indent for second-line drugs is given by the respective ward. The collection of second-line drugs from the DOTS-Plus control room is marked as DOT on the treatment card even prior to the patients having taken the medicine. DOT is not strictly followed for hospitalized patients and drugs were handed over to the patients for unobserved treatment. Most of the adverse drug reactions relate to the gastrointestinal system and are managed conservatively. Some patients had auditory symptoms and even deafness but kanamycin was continued. In only one situation, cycloserine was stopped due to psychosis.

The DOTS corner in NIDCH is the control room for all ambulatory treatment (DOTS and DOTS-Plus). Patients diagnosed at the hospital and not belonging to its domiciliary treatment area are referred to the respective UHC. Similarly, hospitalized patients are also referred to their respective UHC after discharge. In September 2010, there were 189 referrals from the outpatient department (OPD) and 50 hospitalized referrals.

The waiting period for hospitalization is three to seven days. Patients were sometimes lost track of during this period. There is a gap of approximately one week between diagnosis and the start of treatment. Treatment initiation is usually done on Saturdays only.

Of the 643 culture-positive MDR-TB patients diagnosed between August 2008 and September 2010, only 434 were put on treatment. The gap may be due to lack of beds or patient refusal. There were 204 ambulatory patients treated and 108 hospitalized, while 26 patients had died. The DOTS-Plus TB register is not user-friendly. Patient information is to be filled in on four pages and there are chances of administrative errors. The laboratory information in the register was also not complete. There were no recording and reporting formats developed for PMDT. Though there is a system for feedback on the patient's referral forms issued from the DOTS corner, feedback is received from centres around Dhaka in about 50% of cases and rarely from other peripheral centres.

Damien Foundation project

The Damien Foundation operates three hospitals for TB and leprosy (in Netrakona, Mymensingh and Jalchatra). The reference laboratory where DST is performed is located in Netrakona. The laboratory is not accredited by a supranational reference laboratory (SRL), though there is a close monitoring link with the Antwerp SRL. Each hospital has one medical doctor who is assisted by a staff nurse and assistant nurse for clinical management of patients.

All MDR-TB suspects are investigated with sputum smear examination by fluorescein diacetate (FDA) vital staining. Those FDA-negative samples are put on Löwenstein-Jensen culture while FDA-positive samples are put on Löwenstein-Jensen as well as slide culture. The result is available within 10-14 days and rifampicin resistance is taken as surrogate for MDR-TB. The field staff (TLCA and Tuberculosis and Leprosy Control Officer) are informed telephonically. They trace and counsel the MDR-TB patients and accompany them for hospitalization. In some patients, there was a gap between time of suspect identification and actual sputum examination and also between diagnosis and treatment initiation.

Pretreatment investigation includes X-ray, sputum, blood sugar, liver function test, kidney function test and HIV. There is no pregnancy test, thyroid function test or electrolytes. All patients are put on the standard regimen "M" which consists of four to seven months intensive phase and five months continuation phase with four drugs. The decision to treat is the sole responsibility of the treating doctor (sometimes in consultation with the Dhaka-based Medical Adviser). There is no DOTS-Plus committee. Decision for discharge is based on completion of intensive phase of at least four months and sputum conversion. The usual length of stay is four to five months. At the time of discharge the patient is given five to seven days' worth at drugs to tide them over the period until a link with a DOTS provider is established.

There is no separate MDR-TB patient register at the hospital and registration of the MDR-TB patients is done in the common TB register at the peripheral *upazila* from where they were referred. Updating of the treatment card was on a weekly basis and there was a discrepancy in the treatment card entry and the record sheet of the patients.

Adverse drug reactions were not always addressed properly and appropriate action for deranged kidney function test was not systematically taken.

Proper ACSM materials were lacking.

This is not a GLC-approved site and some drugs had been procured locally, hence quality could be an issue. No resistance to quinolone or kanamycin was encountered.

Expansion of PMDT services

A systematic geographical expansion of the GLC-approved project is being planned through divisional engagement, starting with Chittagong and Khulna in 2010 and reaching all divisions by 2011. The NTP has developed an expansion plan, which aims at achieving universal access by 2015. Technical capacity for management of MDR-TB is currently insufficient and may hamper the expansion. Shortage of second-line drugs has occurred and bottlenecks in the supply lines need to be solved before expanding.

Recommendations

- The drug resistance survey should be implemented as soon as possible to provide more accurate estimates on the burden of MDR-TB.
- The definition of MDR-TB suspects should be broadened to include also Category 1 failures, relapses and contacts of known MDR-TB cases. Contact screening should be systematically undertaken.
- Sputum collection and transport issues to be addressed. Samples can be transported through a commercial courier service in CPC solution.
- A DOTS-Plus committee should be established in all hospitals admitting MDR-TB patients.
- Ancillary tests should be done in accordance with WHO guidelines.
- Links between hospitals and the periphery should be strengthened.
- Monitoring and supervision should be strengthened at all levels to ensure DOT both during hospital and ambulatory care.
- Operational research to ascertain and address reasons for initial default especially in NTP areas should be undertaken. Factors leading to default should be addressed.
- Adverse drug reactions should be effectively managed in hospital and in the periphery.
- Ambulatory care should be promoted with limitations of hospital stays.
- Social support and enablers should be provided for patients and providers.
- Standardized recording and reporting formats for PMDT should be developed. The information system should be reviewed and data analysis strengthened.
- Suspects of MDR-TB should be line-listed and their proportion subjected to culture and DST monitored. The proportion of

MDR-TB patients among suspects by type of suspects should also be monitored as well as the proportion of MDR-TB that are actually put on treatment.

- The performance of FDA vital staining should be monitored.
- Uninterrupted supply of quality-assured second-line drugs should be ensured.
- All levels of staff should be trained in PMDT once appropriate training materials have been developed. Private practitioners and medical college teachers should be sensitized about drug-resistant TB.
- The existing PMDT scale-up plan should be reviewed, taking into account the latest WHO recommendations and lessons learnt from the NIDCH pilot and the Damien Foundation project. A gradual scale-up of PMDT in accordance with this plan should be aimed for.
- Capacity for culture and/or DST should be developed in additional laboratories. More DOTS-Plus sites should be identified.
- NTP should assign a full-time focal point for MDR-TB.
- Capacity for managing PMDT should be built at CDCs so that they can act as nodal PMDT centres during scale-up.

12. TB/HIV

TB/HIV is a priority for NTP and the importance of collaborative activities is highlighted in its Strategic Plan 2006-2011. The country has now moved from a low HIV prevalence to a concentrated HIV epidemic with the majority of HIV infections occurring among injecting drug users (7% in a 2008 survey compared to 1.4% in 2000). The overall HIV prevalence remains low in other surveyed groups. TB is the most common opportunistic infection among people infected with HIV.

Responding to recommendations, in 2009 the National Guidelines on TB/HIV Programme Collaboration were developed and the National TB/HIV Coordination Committee was created with inputs from key stakeholders and policy makers. Its main function is to provide strategic guidance to the

programmes and maintain operational oversight. Detailed terms of reference are included in the TB/HIV National Guidelines. Only a small number of activities is being implemented, primarily at the central level and in some divisions. Cross-referral systems between a few DOTS facilities and VCT sites have been established in urban areas. In the more peripheral levels (districts and *upazilas*), almost no TB/HIV services are available. The main focus is on preventive messages, which is been implemented by some implementing partners. A number of health staff working on TB and HIV programmes have been trained on how to identify suspects and initiate cross-referrals. The referral system, however, remains weak.

With 50% of the population infected with MTB, and as the HIV epidemic has the potential to spread fast, any increase in HIV infection will result in additional TB cases and will jeopardize the progress made by NTP in recent years.

The TB/HIV Coordinating Committee is not functioning and this has been identified as one of the key challenges for NTP in the 2009 annual report. Both programmes are working well, independently of each other. There is, however, hardly any collaboration and activities are implemented without links, coordination or joint planning. Moreover the cross-referral systems remain very weak and very little recording and reporting is happening from NTP to VCT and vice-versa. Another challenge for NTP is sustaining the partnerships with HIV/AIDS NGOs without the guidance and support of NASP.

Recommendations

- NTP and NASP should resume discussions on the TB/HIV collaborative efforts. NTP should take the lead in this effort.
- NTP and NASP should review the function and membership of the TB/HIV Coordination Committee and ensure regular (quarterly) meetings. Meetings should be led by key staff from both programmes and hosting the meetings should be alternated. Meeting minutes should be shared with all partners.
- NTP and NASP should disseminate the TB/HIV guidelines to all partners and key stakeholders.

- The TB/HIV Coordination Committee should jointly develop training materials and tools and provide training or refresher training to TB and HIV health staff.
- The TB/HIV Coordination Committee should review and update the referral recording and reporting tools; identify gaps in using the tools, and develop and implement a strategy to strengthen the cross-referral system.

13. Infection control

Tuberculosis Infection Control (TB IC) is a combination of measures aimed at minimizing the risk of TB transmission both within the community as well as in health-care facilities. It is one of the twelve collaborative activities for controlling TB and HIV. The emergence of MDR/XDR-TB has added urgency for developing and implementing infection control policies in health-care settings at different levels. These include DOTS centres, CDCs and hospitals, MDR-TB management sites, smear microscopy centres and laboratories where TB culture and DST are performed. The key strategies would focus on managerial, administrative, environmental and personal protective measures.

In most of the health facilities visited by the review team, proper triage and cough etiquette were not practiced. The health education material on cough etiquette and proper sputum disposal is not adequately displayed. The waiting areas and examination rooms are overcrowded and do not always have adequate natural or mechanical ventilation.

In NIDCH, wards are well ventilated, patients mostly wear cloth masks, beds have good spacing distance. As there is mixing of patients (MDR-TB, sputum-positive and -negative) in some wards there is scope for nosocomial transmission. Sputum disposal is done without disinfection by the patients themselves. Biomedical waste is not segregated in the wards. The Municipal Corporation collects all different types of waste in one large container and disposes it as landfill without disinfection. There is provision for incineration at some sites.

In the Damien Foundation hospitals, there is no infection control policy in place. However the wards are well-ventilated and there is provision of ultraviolet light which is used at night when doors and windows are closed.

The patients use cloth masks but there is no N95 mask for the ward staff or laboratory technicians. The beds are placed very close to each other and wards are fairly overcrowded. The infectious and drug-resistant patients are segregated, though in adjacent wards using common bathrooms and dining hall, thus leaving ample chance of cross-infection. Biomedical waste management was not appropriate. There is no segregation of different type of waste and all (including plastics) are incinerated together.

Recommendations

- The draft TB IC policy and plan should be finalized, approved and implemented.
- All health-care providers should be trained in TB IC.
- All health-care workers should be screened annually for TB.
- TB suspects in general OPDs in hospitals should be fast-tracked.
- Admitted TB patients should be segregated in distinct MDR-TB, smear-positive, other TB wards.
- Waiting areas of OPDs, including registration areas, should be well ventilated.
- Proper sputum collection areas should be identified: in open air in rural areas and in properly ventilated areas in urban congested hospital facilities.
- Adequate ventilation and spacing should be assured in the wards.
- N95 masks should be provided for personnel of MDR-TB wards, bronchoscopy suites, nebulization areas or wherever TB patients are managed.
- Necessary logistics such as hand wash, masks, etc. should be made available.
- Proper segregation of biomedical waste at all health facilities and disposal of same through incineration of non-plastics and disinfection with burial/mutilation and municipal disposal of plastics should be undertaken.

14. Public–Private Mix

The collaboration with NGOs and other partners has been expanded. The NGO support is largely based in demarcated geographic areas for service delivery, thereby minimizing duplication. The National Anti-Tuberculosis Association of Bangladesh (NATAB) provides support in the area of ACSM in the entire country, while NGOs in urban areas provide primary health care services including TB, but their catchment area is less defined. The partner NGOs are linked to NTP through MoUs. Since Round 8, however, additional subrecipients have been included through an agreement with the NGO Principal Recipient but without formal linking to NTP. Services offered by different partners are not always complementary, leading to fragmentation of the programme and increased challenges for coordination.

While NTP is primarily responsible for programme coordination and policy and strategy formulation for all components of TB control, NGOs and partners are providing support for strengthening the government health system for the community-based expansion of DOTS. In return for their services, the government has allowed them to use government infrastructure and available staff for DOTS activities throughout the country. NGOs are supporting NTP in strengthening laboratory services, diagnosis, treatment, follow up, functioning EQA laboratory, transportation, local storage of drugs, local training, OR and ACSM.

Tuberculosis control activities in more than 80% of the rural areas are provided by two NGOs (BRAC and Damien Foundation), covering approximately 82 million and 27 million people respectively. Implementation of TB control activities in urban settings are mainly carried out by two networks of NGOs: one under the United States Agency for International Development-supported Smiling Sun Franchise Programme and the other as part of the Asian Development Bank-funded Second Urban Primary Health Care Project.

Some progress has been made since the fourth Joint Monitoring Mission in 2007 in the area of PPM. A National Steering Committee for PPM was formed in 2008. All 36 medical colleges (including 23 private ones) are actively engaged and have DOTS corners in their hospitals. Key opinion-leaders among the leading chest physicians in the country are also actively engaged in NTP activities and are promoting the Stop TB strategy among

their peers as well as among undergraduate and postgraduate medical students. Large-scale corporate sector engagement through the Bangladesh Garments Manufacturers and Exporters Association (BGMEA) is initiating service links for TB control activities in its ten clinics in Dhaka and Chittagong. The garment sectors employs more than 2.4 million workers, 80% of whom are women. The garment companies are committed to allow special sick leave, fewer working hours and nutritional support for TB patients. The involvement of village doctors in the delivery of DOT during ambulatory MDR-TB treatment has also contributed to very low default rates.

Many gaps and challenges in PPM remain and need to be addressed to achieve palpable impact. Involvement of private health-care providers (medical doctors and pharmacists) is essential to augment the impact of TB control. The current level of their involvement is suboptimal.

There is no national-level PPM implementation plan and no standardized training guidelines and materials to orientate/train private medical providers and pharmacists. Although private doctors are frequently the first point of contact for TB suspects, especially in urban settings, the proportion of private doctors and pharmacists engaged in TB control is limited and TB management practices in the private sector are not standardized. No system of record-keeping of cases referred to NTP exists. The precise number of TB cases detected and treated is, therefore, not known. Only very few specialists and private medical providers are referring TB suspects to NTP. Pharmacists and drug sellers who are also another point of contact for health care for many citizens of the low-income groups are not yet directly linked with NTP. Only a few NGO partners have established links with these providers on a pilot basis. Anti-TB drugs are available in the drug shops, but the quality of these is not guaranteed. The fact that many private providers are diagnosing and treating patients without following NTP guidelines may lead to the development and amplification of drug resistance.

Recommendations

- A National PPM Advisory Board should be established.
- NTP and NGO partners should jointly develop a multi-year national PPM strategy that should include the following elements:
  - Engagement of all care providers through PPM approaches;

- Promotion of the use of the International Standards for Tuberculosis Care;
- Annual national-level PPM meetings and workshops to promote coordination, review progress, resolve common problems, finalize PPM plans and intensify partnerships and links;
- Quarterly coordination meetings with all partners involved.

➢ NTP should work with the national committee on the rational use of drugs:
- to limit the inappropriate use of anti-TB drugs through development of guidelines for pharmacists;
- to promote correct prescription of drugs;
- to promote referral to NTP services for free treatment; and
- to promote good quality of drugs sold in private pharmacies.

15. Advocacy, communication and social mobilization

ACSM is essential to controlling TB. Over the years ACSM has been successfully applied to address four key challenges: (1) mobilizing political commitment and resources for TB; (2) improving case finding and treatment adherence; (3) combating stigma and discrimination; and (4) empowering people affected by TB and their communities. ACSM comprises different sets of activities with different objectives. These are complimentary and closely interlinked. They work synergistically when used together. Thus ACSM activities should be developed in parallel and not separately.

ACSM is a key component in the National Strategic Plan to Control TB (2006-2010). Over the last few years a number of positive strides have been made in this area. In 2007 NTP and its partners developed and approved the National ACSM Strategy 2008-2012. The SOPs on Strengthening Coordination, Planning and Monitoring & Evaluation were developed in 2009 with the following objectives: (1) to create unity in the national ACSM programme; (2) to provide strategic vision and guidance for the ACSM annual action plan and evaluation; and (3) to standardize materials and interventions

on ACSM. Significant funding for ACSM was provided through GFATM Rounds 3, 5 and 8 as well as other sources. As a result, community organization and mobilization activities are well established and widely implemented, primarily by the partners. The first phase campaign was implemented in 2008-2009 focusing on community advocacy and orientation of key people such as pharmacy staff, village doctors, teachers, cured patients, journalists and other community volunteers; utilizing community networks such as *shastya shebikas* to increase awareness on TB; linking communities with health services; and ensuring treatment adherence by implementing DOT. Billboards, signage, and client information, education, and communication materials are widely available. The second phase of the campaign (2009-2010) has focussed on increasing awareness of TB among high-risk groups, treatment efficacy and support. Two studies conducted in 2007 and 2009 have identified stigma, gender, socioeconomics, illiteracy, and demographics to be of great concern.

Despite all these achievements there are still a number of challenges in implementing the national ACSM strategy. The strategy's main focus is on community mobilization aiming to increase TB awareness at division and *upazila* levels; very little is been done in urban settings. It fails to address policy and programme advocacy or capacity-building, especially interpersonal communication skills, for DOTS providers. Furthermore, the strategy does not lay out a clear plan to address critical issues such as stigma, discrimination, and gender, and it does not include a monitoring and evaluation framework. The ACSM strategy is not yet disseminated to NGO implementing partners, who are thus implementing activities in the absence of the strategy and without NTP guidance, coordination and joint planning. In addition partners have not yet developed ACSM division plans that can address site-specific issues and are using ACSM master plans developed at the central level. These plans primarily focus on the orientation of the various community groups. The ACSM Steering Committee at the central level does not meet regularly and ACSM subcommittees at divisions have not yet been created. NTP and partners have good skills in planning and implementing community organization and mobilization activities, but they have limited knowledge of ACSM and lack the skills that are needed for effective planning, implementing, and monitoring of ACSM activities.

Recommendations

- As NTP has a position for National Consultant (ACSM), an expert with ACSM qualifications should be contracted to work with NTP and partners to review knowledge, attitude and practice studies and other available data and modify the ACSM strategy to address specific programme gaps at all levels, address TB/HIV and engage all providers, and update the ACSM guidelines to respond to the revisions made in the strategy. This exercise will include developing the ACSM M&E framework and key performance indicators.
- NTP should disseminate the modified ACSM strategy and SOPs to all implementing partners at national and division levels.
- NTP should review the function and membership of the ACSM Steering Committee and use this mechanism to strengthen the platform for coordination and joint planning for ACSM activities by all implementing partners. This committee should be led by NTP and represented by all implementing partners. Regular quarterly meetings should be conducted and meeting minutes and action steps should be shared among all partners.
- ACSM sub-steering committees should be created at district levels to coordinate and integrate ACSM planning among all implementing partners. The committee should lead the development of the district ACSM action plans and guide the implementation and monitoring of these activities. This committee should be led by the Civil Surgeon and represented by all implementing partners, and regular quarterly meetings should be organized. Meeting minutes and action steps should be shared among all partners.
- ACSM training materials, tools, and client IEC should be developed in coordination with NTP and all implementing partners. These should be pretested to ensure message consistency, accuracy, and appropriateness.
- An ACSM expert should be contracted to conduct a workshop on "What ACSM is and why it is essential to your programme" for NTP, key partners, and WHO. Furthermore, the consultant should provide training to build the capacity of a central-level

ACSM Master Trainers Team. This team should include key staff from NTP and partners. The team should be responsible to provide ACSM training to their implementing partner organizations at different levels.

16. Operational research

The goal of OR is to develop the evidence base for policy formulation. The NTP has identified OR as one of six key elements of its Strategic Plan for TB control. In 2007 two research committees for TB were established: one technical and one implementing and monitoring committee consisting of specialists from NTP, partners, the DGHS Research and Planning Unit, representatives from the Institute of Epidemiology, Disease Control and Research; NIDCH, WHO, ICDDR,B, the Bangladesh Medical Research Council, as well as public health sector specialists. A number of NGOs and academic partners, including BRAC, Damien Foundation, ICDDR,B, the Nuffield Institute (United Kingdom), the Research Institute of Japan and individual investigators have participated in NTP-sponsored research.

A total of US$ 1.9 million has been earmarked in the Global Fund Round 8 proposal (2009-2013) for OR. Priorities identified under Round 8, to be carried out in partnership by NTP, WHO, ICDDR,B, NGOs and medical colleges, include research pertaining to health-care-seeking behaviour, quality of smear microscopy, prevalence of TB/HIV, socioeconomic condition of TB patients, TB in prisons and TB in special situations. The consolidated Round 10 application (2010-2015) proposes a total of US$ 4.5 million for OR activities, including continuation and expansion of earlier initiatives.

The reviewers received a report of research studies sponsored by NTP in 2008-2010 (Table 4). The report on the TB prevalence survey was also made available. During 2009-2010, BRAC has initiated new studies on occupational TB and TB and nutrition in its service areas.

Table 4: *Research protocols for 2008-2009*

Sl No.	Title	Principal Investigator	Agency
1	Factors contributing to inadequate referrals of tuberculosis cases among private practitioners in urban areas.	Prof. Mahfuzur Rahman	Head, Dept. of Community Medicine, National Institute for Preventive and Social Medicine (NIPSOM)
2	Delay in health seeking, diagnosis and treatment for TB and its associated factors	Assoc. Prof. Dr Sayed Mohammed Arif	Dept. of Medicine, Dhaka Medical College
3	Knowledge and attitude about TB transmission, treatment and its control activities in peri-urban areas	Prof. Md. Shah Alam Bhuyan	Head, Dept. of Health Education, NIPSOM
4	Effects of DOTS on sputum conversion rate after two months of treatment among sputum positive cases in selected TB clinics	Prof. S A Mansur Ahmed	Dept. of Population Dynamics, NIPSOM
5	Private practitioners' (formal and non-formal) factors contributing behind inadequate referral in urban areas	Dr A K Md. Ahsan Ali	Director, Community Participation for Health and Development, Zigatala, Dhaka
6	Influence of host factors of TB patients on sputum conversion: a nested case control study.	Dr Meerjadiy Sabrina Flora	DGHS, Mohakhali
7	Burden of PTB among risk group including HIV/AIDS patients, garment workers and slum dwellers: study in Dhaka city	Asst. Prof. Dr Hosne Ara Begum	Institute of Health Economics, University of Dhaka

Sl No.	Title	Principal Investigator	Agency
8	A community-based intervention to increase referral of children with suspected TB and case detection at 13 microscopy centers at the *upazila* level	Dr Khurshid Talukder	Consultant Paediatrician and Research Coordinator, Centre for Women and Child Health, Savar
9	Analysis of current status of NTP activities in relation to its objectives and goals in some urban and rural areas of Bangladesh	Assoc. Prof. Dr Amirul Hassan	Dept. of Public Health and Hospital Administration, NIPSOM
10	Are serum micronutrient levels altered in patients with TB in Bangladesh?	Dr Shah Md. Mahfuzur	Bacteriologist, Institute of Public Health, Mohakhali
11	Cost and cost-effectiveness analysis of public-private partnership: Provision of DOTS for TB in Bangladesh.	Dr Md. Ziaul Islam	Dept. of Community Medicine, Dhaka Medical College
12	Merits of mycobacterial culture in comparison to sputum microscopy and radiography for the diagnosis of smear-negative cases among new outpatients at NIDCH	Asst Prof. Dr S M Mostafa Kamal	Dept. of Pathology & Microbiology, NIDCH
13	Delay in health seeking, diagnosis and treatment for TB and its associated factors		
14	An exploration of gender distribution, clinical profile, associated factors including pregnancy and health seeking behaviour of adult female TB patients	Assoc. Prof. Dr Saria Tasnim	Dept. of Obstectrics & Gynaecology, Institute for Child and Maternal Health, Matuail

Sl No.	Title	Principal Investigator	Agency
15	A pilot study to evaluate adenosine deamilnase level, skin patch test and interferon-γ releasing assay in clinically suspected adult patients with MTB	Prof. Dr Md. Sawkat Hossain	Head, Dept. of Immunology, Bangladesh Institute for Research on Diabetes, Endocrine and Metabolic Disorders

Table 5: *Research protocols for 2010*

Sl No.	Title	Principal Investigator	Agency
1	Ethambutol induced optic neuropathy	Prof. Dr Sharifuddin Ahmed	Chairman, Dept. of Ophthalmology, BSMMU
2	Explore to process and follow up sputum examination for PTB cases	Dr Abu Naser Zafarullah	Public Private Partnership Project
3	Quality assessment of DOT under NTP Bangladesh	Dr K M Rezaul Haque	Chairman, Society for Empowerment, Education and Development
4	PTB among the workers of some selected garments industries in relation to NTP of Bangladesh	Assoc. Prof Dr Amirul Hassan	Head, Dept. of Public Health and Hospital Admin, NIPSOM
5	Quality assessment of treatment of TB with DOT in Dhaka metropolitan City	Prof. M A Hafez	Dept. of Epidemiology and Biostatistics, Bangladesh Institute of Health Sciences
6	Clinical profile of diagnosed TB cases among Bangladesh children aged 3 months to 18 years	Dr Md. Abdullah Al Mamun	Consultant, Child Research and Infotech, Ltd.

Sl No.	Title	Principal Investigator	Agency
7	Risk factors for MDR TB in Bangladesh	Asst. Prof. Dr Md. Atiqul Haque	Dept. of Medical Statistics, BSMMU
8	Factors Associated with MDR-TB	Assoc. Prof. Dr Meerjady Sabrina Flora	Dept. of Epidemiology, NIPSOM
9	Distribution and determinants of MDR-TB patients in Bangladesh	Asst. Prof. Dr Nazrul Islam	Dept of Reproductive and Child Health, NIPSOM
10	Cutaneous TB in children and adolescents	Asst. Prof. Dr. Abida Sultana	Dept. of Dermatology and Venereology, BSMMU
11	A study to determine the relationship between tobacco consumption and pulmonary TB	Dr A S M Alamgir	Dept of Virology, Institute for Epidemiology, Disease Control and Research (IEDCR)
12	Pulmonary TB burden among HIV/AIDS patients attending VCT facilities	Dr Md. Mushtaq Hussain	Dept. of Medical and Social Sciences, IEDCR

The Fourth Joint Review team recommended that "findings of research be documented on time and disseminated to policy-makers, (potential) donors and health planners to develop new approaches towards more effective TB control". Since 2007, the following publications involving WHO, NTP and NGO research partners have appeared in the peer-reviewed literature:

- Gender differences in TB management (BRAC in association with Karolinska Institute (Sweden), *IJTLD*, 2008);
- TB in the Dhaka Central jail (ICDDR,B, NIDCH, WHO, NTP; *PLoS ONE*, 2010);
- Observational study of a short-course MDR-TB treatment regimen (Damien Foundation and International Union, *AJRCCM*, 2010);

- The FIDELIS case detection programme (BRAC, *AJPH*, 2008);
- TB-related stigma in Bangladesh, Malawi, and Colombia (BRAC, in association with the Swiss Tropical Institute, and others, *IJTLD*, 2008).

Through its partners and collaborators, NTP has increased capacity for OR. Some surveillance studies critical to formulating new policies and programme capacities in the areas of MDR-TB, TB/HIV and childhood TB remain to be completed. A nationwide TB prevalence survey conducted in 2008-2009 by ICDDR,B needs to be reviewed.

It is always recommended that the NTP research programme prioritize research objectives to address high-impact programme constraints and policy development targets. In addition to completing key surveillance studies, some examples include:

- Comparison of MDR-TB regimens by treatment history and clinical outcomes;
- Studies to support change in the "three-smear" policy, and validation of EQA concordance rates and sputum collection methods;
- Studies characterizing diabetes and smoking burden in TB patients;
- Development of new requests for proposals addressing system-wide technology assessment needs, particularly with respect to new generation diagnostics for MDR-TB; and
- Innovation grants to evaluate novel local practices, such as involving private-sector employers, educating pharmacists and use of cooperative regional case management systems.

To improve quality and dissemination of research results, NTP should encourage publication of grantee research in peer-reviewed journals. In addition, NTP should convene research partners for input on common research methodologies at the protocol development and analysis stages in order to facilitate comparability and implementation of research findings.

Recommendations

- Key surveillance studies (TB prevalence, drug resistance, childhood TB) need to be completed in order to plan new programme capacities.
- Strategic planning to capture key constraints, programme adoption targets, and universal access agenda should be conducted.
- Emerging national research needs in technology assessment for new diagnostics and MDR-TB treatment regimens should be anticipated.

17. Human resource development for TB

In discussions and documents, an HRD plan for TB was often referred to as well as to a HRD strategy. A draft was developed by an external consultant but was not yet published as a NTP document.

In the facilities visited and from the information received in discussions at the civil surgeon offices, the following main findings regarding staffing, training and supervision were repeatedly observed and mentioned.

All facilities visited reported one or more vacancies for key positions. Some vacancies had existed for more than two years. At national level, only 5 out of 21 Global Fund-funded posts were filled. Two key positions were vacant at the central unit of NTP including an Assistant Director as well as 10 support staff (Table 6). At divisional level, only one division had a TB consultant (Table 7). The government recruitment policy is not very clear and appears to be time-consuming. For government staff, no job descriptions were found in any of the facilities visited. However, NGO staff were always able to show a written job description for their post. The national TB manual contains some (rather general) job descriptions for each level of staff.

Table 6: *List of posts of MBDC (including leprosy)*

Sl. No	Name of post	Sanctioned posts	Filled posts	Vacant posts
01	Director	01	01	-
02	Deputy-Director	02	02	-
03	Assistant Director	02	01	01
04	Deputy Programme Manager	06	06	-
05	Medical Officer (Epidemiologist)	01	01	-
06	Medical Officer	05	05	-
07	Administrative Officer	01	02	-
08	Statistical Officer	01	-	01
09	Health Educator	02	02	-
10	Secretary	02	01	01
11	Steno-typist	02	-	02
12	Upper Division Assistant	01	01	-
13	U.D.A.-cum-Cashier	01	01	-
14	Accountant	01	01	-
15	Statistical Assistant	01	01	-
16	Office Assistant-cum-Typist	05	02	03
17	Storekeeper	01	01	-
18	Radiographer	01	01	-
19	Home Visitor	01	01	-
20	TLCA	01	01	-
21	Mechanic	01	01	-
22	Electrician	01	01	-
23	Driver	07	07	-
24	Gestatner Operator	01	01	-

Sl. No	Name of post	Sanctioned posts	Filled posts	Vacant posts
25	Member of the lower staff society	05	03	02
26	Peon	07	06	01
27	Doptory	01	-	01
28	Guard/Night Guard	05	05	-
29	Cleaner	05	05	-
30	Sweeper	01	01	-

Table 7: *Global Fund staff positions of NTP*

Sl. No	Name of post	Sanctioned posts	Filled posts	Vacant posts
01	International Programme Consultant	01	-	01
02	International Finance Consultant	01	01	-
03	National Programme consultant	01	01	-
04	National Finance Consultant	01	-	01
05	M&E Specialist	01	01	-
06	Consultant TB Laboratory	01	-	01
07	Consultant Epidemiology & Surveillance	01	-	01
08	Consultant Drug Resistance	01	-	01
09	Consultant Training	01	-	01
10	Consultant HR	01	01	-
11	Consultant TB/HIV	01	-	01
12	Consultant ACSM	01	-	01

Sl. No	Name of post	Sanctioned posts	Filled posts	Vacant posts
13	Consultant Procurement	01	01	-
14	Consultant PPM	01	-	01
15	Consultant PAL	01	-	01
16	Divisional Consultant	06	01	05
17	Divisional Consultant ACSM	03	-	03
18	Information Technology (IT) Consultant	01	-	01
19	IT Assistant	01	-	01
20	Office Secretary	03	02	01
21	Finance Clerk	02	02	-
22	MIS Assistant	01	-	01
23	Procurement Assistant	01	-	01
24	Driver	14	12	02

The NTP provides training for higher-level professionals on programme management, using the WHO modules, and for laboratory staff in smear microscopy and EQA. While some NGOs train their own staff as well as facilitate training of government personnel at lower levels, other NGOs depend on NTP for training of their health workers. NTP also provides refresher training for laboratories and TB management. NGOs provide refresher training for field staff. No training modules or materials were found at any of the facilities visited, nor at national level. During a short visit of a training session, no training materials of any form were observed. The training methodology was top-down, with only the trainer talking and participants listening and making notes.

The NTP does not work with an overall training plan. NGOs have their own training plans. Training needs in general are based on number of untrained staff and rarely on programme needs.

Opportunities for international training are dependent on availability of funds, which have been abundantly available under Global Fund Round 5. The nomination process for identification of candidates remained unclear.

There was also no systematic feedback available from participants to international training courses, workshops or meetings. Overall, there is no structured follow-up after training which would allow for sharing new knowledge and skills with coworkers and implementation of new methodologies, tools, approaches, etc.

Recommendations

- NTP should publish by 31 March 2011 its HRD Strategic Plan and prepare annual implementation plans to address all areas and levels of TB control (including innovative approaches to recruit and retain trained staff).
- The MoH&FW should, in collaboration with NTP, within the fiscal year 2011-2012 take necessary actions to fill vacant key positions at national, divisional and district level with properly qualified and well-trained staff.
- NTP should review, update and distribute clearly defined roles and responsibilities for national, divisional and district-based staff.
- NTP should, in consultation with NGO partners, develop and implement an overall training plan 2011 (basic and refresher) for both NTP and NGO staff at all levels.
- NTP should develop a mechanism for follow-up after (international) training in order to improve the impact of training.
- NTP should plan for monitoring and further improving the quality of training in respect of: target groups, training needs, objectives, training methodology, evaluation, follow-up, and trainers.

18. Health systems

The Government of Bangladesh has given high priority to TB control. The Stop TB strategy has been well integrated in the National Health Service delivery system. NGOs have been playing an instrumental role in TB control. Over the last several years the programme has achieved many milestones.

The TB control services are delivered through all general, district and medical school hospitals, UHCs, CDCs, and community clinics as well as through NGO clinics and through a network of community volunteers. Patients have to travel less than 10 kilometre and have to spend an average of taka 170-200 including transport costs to obtain services. However, in hilly and some rural areas the distance, travel time and cost may be significantly greater. Although many patients are satisfied with the services provided by NTP, privacy and dignity of patients should be preserved at all health facilities.

Government is providing microscopy facilities to all health facilities at UHC level or above. X-ray facilities are not always functional, while culture facilities will be expanded to selected centres in a phased manner. In addition to the diagnostics equipment, biosafety equipment such as incinerators is required for infection control in health facilities. Distribution of drugs and reagents was smoothly organized. Though adequate funding was available, accessing funds has been marred by various bottlenecks, especially since 2009, affecting particularly drug supply and overall programme management.

The Government has taken steps to expand hospital facilities by increasing the bed strength of many hospitals. Expansion of human resources, however, appears not to be at par. As a result, many hospitals and UHCs are suffering from inadequate numbers of senior and junior consultants, medical officers and paramedical personnel (X-ray and laboratory technicians, pharmacists, etc.). This hampers the services provided to patients as well as case detection and treatment of TB patients. Many of the in-charge positions of CDCs are vacant and several of those clinics are running with acting arrangements.

The information system of NTP is well established and individual patient records and registers are maintained at all levels. Monthly, quarterly and annual returns are sent to NTP by all NTP service providers. The referral system, however, needs to be strengthened, especially for newly detected TB patients being referred for treatment in a facility different from that where they are diagnosed. Information gathered through all means needs to be used for planning services, monitoring implementation of NTP activities and evaluating impact. Evidenced-based decision-making should be strengthened at all levels of the health system and especially in NTP activities.

Wider use of electronic reporting may minimize the delay in compiling information at national level. Although computers and Internet connections have been provided to many facilities, electronic communication is not up to expectations.

Although there are many stakeholders in NTP, the government is directly accountable for ensuring quality TB services. Hence ownership of the programme is with the government, Ministry of Health and NTP. The ownership of the programme at district level lies with the Civil Surgeon and at the *upazila* level with UH&FPO. It was observed that the ownership and responsibilities of implementation of core programme activities are shifting to supporting partners, which carries a risk for the long term.

Continuous close supervision is the main pillar of success in any health programme and NTP needs extensive supervision at all levels. The supervision of field workers of NGOs is better compared to the government care providers at field level. As NTP has multiple partners, proper coordination at all levels is crucial. There should be Advisory, Steering and Implementation and Monitoring Committees at national level; they should meet at regular intervals and proper records of these meetings should be maintained. Appropriate follow-up actions should be taken and implementation of recommendations should be monitored.

At district and *upazila* levels coordinating committees should meet regularly (at least quarterly) to review the progress of implementation and take appropriate corrective measures. Records of these meetings should be shared with higher levels for distance supervision.

The private sector plays an increasingly important role in providing health care services to the country. A very significant part of the country's population attends private health care facilities, including for TB. Involvement of private health care providers is essential to implement a successful NTP programme, but the current level of their involvement is suboptimal. Therefore, NTP should develop a pro-active programme to get the private sector involved in NTP activities.

Recommendations

- The MoH&FW and NTP should fully own the programme and NTP should take the lead in passing ownership of the programme to all levels.
- The MoH&FW should develop a comprehensive HR plan for the government health sector and produce adequate numbers of consultants, doctors and paramedics.
- The MoH&FW should develop policies for recruitment, distribution and retention of HR in the government health sector, giving priority to recruitment of staff in rural areas.
- Post descriptions, performance measurement systems, appointments and promotional schemes and transfer schemes should be streamlined.
- All the officers/health staff at all levels should be held responsible for implementation of their respective anti-TB activities.
- A supervision system for health staff at all levels should be institutionalized, and supervisory notes should be shared with higher levels.
- Supervision guidelines and checklists should be prepared and distributed among all supervising officers.
- Coordination committees at national, district and *upazila* levels should meet periodically (at least quarterly) to review and monitor progress.
- Deficiencies in the current information system should be corrected and all the detected patients should be notified and treated.
- ICT should be used to avoid delays in reporting.
- Evidence-based decision-making at all levels should be strengthened.
- The private sector should be further involved in NTP activities countrywide.

19. Financing

Although the government's funding for the NTP fell from 2006 to 2010, NTP has secured substantial external funding for TB control since 2003 and this has correlated with growth and consolidation of critical programme activities. From 2007 to mid-2009 NTP (government Principal Recipient) lacked the capacity to fully use the funding made available by the Global Fund through Rounds 3 and 5. The NTP's difficulty in fulfilling the Global Fund conditions regarding installation of financial software and recruitment of financial staff led to interruption in disbursements of funds for programme activities, including delays in disbursement of funds for procurement and timely shipment of drugs. Due to accountability issues, funds for programme activities have not been released by the Global Fund since late 2009, and as long as the accountability problems are not satisfactorily addressed, the Global Fund will not release the funds committed. In addition, there have been delays in obtaining financial reports from WHO in the format prescribed by the Global Fund.

Table 8 shows the component and source-wise expenditure of NTP during 2007-2009.

Table 8: *Component-wise expenditures of NTP, 2007-2009 (US$)*

Programme component	Government	External sources	Total
ACSM	0	2 944 973	2 944 973
Drugs	700 482	5 572 647	6 273 129
Training	326 117	5 637 518	5 963 635
Others	2 480 920	21 520 231	24 001 151
Total	**3 507 518**	**35 675 369**	**39 182 887**

Table 9 shows the annual approved (2010) and projected government budget (2011-2016) for NTP as per the revised Health Sector Planning.

Table 9: *Component-wise government budget, 2010-2016 (US$)*

Component	2010	2011	2012	2013	2014	2015	2016
ACSM	0	0	0	0	0	0	0
Drugs	1 532 847	510 949	525 547	540 146	554 745	610 219	671241
Training	143 109	911 387	618 102	668 759	671 825	739 007	812 908
Other	3 457 314	839 416	902 190	940 146	981 022	1 079 124	1 187 036
Total	**5 133 270**	**2 261 752**	**2 045 839**	**2 149 051**	**2 207 591**	**2 428 350**	**2 671 185**

The government budgets differ substantially from the budget projections included in the Global Fund Round 10 proposal, in which the estimated domestic (government funds, loans and debts relief) contribution ranged from US$ 688 000 during 2011 and between US$ 272 000 and US$ 362 000 annually during 2012-2015. This corresponds with a government contribution of 0.5%-1.3% of the funding needs of NTP, which ranges from US$ 50 million to US$ 59 million annually during the period 2011-2015.

Even if the projected government budget contributions as shown in Table 9 are provided, the government contribution to NTP based on funding needs shows a decreasing trend from 4.5% during 2011 to 3.8% annually during the following four years. The declining government contribution to the NTP budget makes the programme vulnerable to financial shortages and interruption of activities unless progressive government funding and defensive planning are initiated. In particular, this means provision of critical funds for procurement of first-line anti-TB drugs to stabilize the supply chain shortages. In addition, the shortage of essential laboratory supplies for sputum smear microscopy is alarming and requires government support and urgent attention.

Recommendations

- NTP through MoH&FW and MoF must ensure annual provision of funds in the programme budget for payment of custom duties and fees (4% of the total value of internationally procured drugs) from 2010 onwards.
- MoH&FW should fulfill all conditions precedent to GFATM agreements, including electronic financial management and recruitment of key staff.

- MoH&FW must address the accountability issues with Global Fund in order to ensure timely disbursement of funds for uninterrupted procurement of drugs and essential diagnostic supplies.
- NTP senior management should ensure timely submission of programmatic and financial reports to the Global Fund to avoid future delays in release of funds and initiation of procurement processes.
- NTP senior management should take steps to ensure that the government includes increasing funds for TB drugs, critical diagnostic supplies and activities in the next health sector plan.

Annex 1

List of reviewers

International Reviewers

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Dr Md. Rezwan Kamar
National Programme Officer, WHO

Dr Vikarunnessa Begum
Temporary National Professional, WHO

Annex 2

Programme

Date	Activity					
01 October (Friday)	Arrival of international reviewers					
02 October (Saturday)	Introduction of team members Briefing by NTP Briefing by NGO partners: AAS, BRAC, Damien Foundation, FHI, HEED, ICDDR,B, LEPRA, NATAB, PPPP, SSFP, TLMB, UPHCP, WHO					
03 October (Sunday)	Continue briefing by NGO partners Formation of teams Finalizing data collection documents					
04-08 October (Monday - Thursday)	**Team I** Dhaka City and Dhaka Division	**Team II** Dhaka City and Sylhet Division	**Team III GDF** Dhaka City and Chittagong Division	**Team IV** Khulna and Barisal Divisions	**Team V** Rajshahi Division	**Team VI** Rangpur Division
09 October (Saturday)	Preparation of team presentations					
10 October (Sunday)	Presentation by teams Summary of technical areas					
11 October (Monday)	Summary of technical areas					
12 October (Tuesday)	Summary of review conclusions and recommendations Debriefing with Ag. WHO Representative Debriefing with Secretary, MoH&FW; and Director-General, DGHS					
13 October (Wednesday)	Departure of international reviewers					

Annex 3

Places visited and people met

TEAM I (Dhaka city and division)

NIDCH

Asst Prof. Dr Bashir Ahmed, Medical superintendent

Asst Prof. Dr Wahiduzzaman Akhand, DOTS-Plus project coordinator

Physicians and surgeons

Asst Prof. Dr S M Mostafa Kamal, Coordinator NTRL

Mugdha urban clinic (UPCHP)

Mr Habibur Rahman, Project Manager

Mr Ehtasamul Haque

Doctors and other staff

Shyamoli CDC

Dr Md. Abul Quasem, Officer-in-Charge

Civil Surgeon Office, Netrakona

Dr Siddeshar Saha, Civil Surgeon

Damien Foundation TB and leprosy hospital, Ananatapur, Netrakona

Dr Paul Daru, Medical Officer

Damien Foundation TB and leprosy hospital, Shambuganj, Mymensingh

Dr Minarul Islam, Medical Officer

Dr Pankaj Kumar Das, Medical Officer

Mr Subhash Chandra Sarker, Sr Project Director, MTLCP

Muktagachha UHC, Mymensingh

Dr Tajul Islam, UH&FPO

Mymensingh CDC

Dr A B M Mazharul Islam, Jr Cons. (in-charge)

Gazipur Sadar UHC

Dr Ali Hyder Khan, UH&FPO

Friends of Bangladesh hospital, Dattapara, Tongi, Gazipur

Mr Augustin Halder, Business Manager

TEAM II (Dhaka city and Sylhet division)

Dhaka Shishu Hospital

Prof. Dr Manzur Hosain, Director

Prof. Dr Ruhul Amin, Department Head

Dr Prabir, Resident Physician

Dr Azam, Jr Consultant

Dr Mamun, Medical Officer, BRAC

Dr Sabana Siddika, PO, BRAC

Chankharpool TB Control Institute

Dr A.Hamid, Superintendent

Dr S. Hemaetuddin Jugol, Coordinator

Mr Chow, EQA Controller

S Mizanur, Med. Tech. (Lab)

Bimol, Med. Tech. (Lab)

Mobarak, Med. Tech. (Lab)

Prosanto, Laboratory Assistant

Ashar Alo Society

Ms Habiba Akter, Executive Director

Dr Nilufer, Medical Consultant

Ms. Asma Pervin, Deputy-Director

Marie Stopes Clinic Society

Dr Hasimul Islam, Project Manager

Rehana Akter, Project Administrator

Dr Hamida, M&E Officer

Dr Paromita Rozario, Clinic Manager

Samia Siddika, Laboratory Technologist

Samima, paramedical staff

PSTC Clinic (SSFP)

R. Reza Chow, Project Director

Dr Subrata, Project Manager

Nasima, Clinic Manager

Zinnatunnesa, DOT provider

Mahbuba Khatun, Med. Tech. (Lab)

Sahidur, M&E Officer

BGMEA Health Centre, Malibagh

Md. Saiful Islam, Asst Secretary (Health), BGMEA

Dr Shafiullah Talukder, Project Coordinator (TB), BGMEA

Masud Qader, Chairman, Standing Committee

Saifur Reza, Chairman

Dr Syed Zakir Hossain, Chief Medical Officer

Dr Lovely, Medical Officer

Lima Akhter, Laboratory Technician

Nargis Pervin, Paramedical staff

Zannatul Ferdous, Field Staff

Civil Surgeon Office, Sylhet

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Mr Ranju, District Manager, BRAC

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Ms Shilpi Rani Das, PO, BRAC

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Dr Md.Oliur Rahman Adnan

Dr Suprava Das

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Farida Begum, Family Welfare Visitor

Abdul Matin, President

Abdul Motlib, Vice-President

Hanif Mohammad, Treasurer

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Amina Begum, Member

Fatema Begum, Member

Topsuma Habiba, Member Upazila Parishad

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Mr Abdur Rahman, Sr Med. Tech.

Mr Anisur Rahman, Med. Tech. (BCG)

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Rangamati CDC

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Dr Haripurna Tripura, Regional Health Coordinator, BRAC

Ratan Drug House (private pharmacy)

Sujit Shil and Subhash Das, drug sellers

Mr Ranjit Kumar Das, Village Doctor

Sadar Hospital, Rangamati

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Mr Sankar Kumar Nandi, Project Director, Salvation Army

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Md. Shahinur Rahman, District Manager (Jessore), BRAC

Sadar Hospital, Jessore

Dr Salauddin Ahamed, Superintendent

Dr Muslim Uddin, Consultant (Medicine)

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Salvation Army, Jessore

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Civil Surgeon Office, Satkhira

Dr Jahangir Atik, Civil Surgeon

Dr Rafiqul Islam, Medical Officer

Mr Shuvardi, Chief Laboratory Technologist

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Debhata UHC, Satkhira

Dr Easin Ali Sarder, UH&FPO

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Dr Othis Kumar, Medical Officer

Dr S K Shajahan Ali, Medical Officer

Dr Utma Romana Jahan, Medical Officer

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Omerash Kumar, Medical Assistant

A. Rashid, Storekeeper

Sujit Kumar, TLCA

Kalamullah, Med. Tech. (Lab.)

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Sadar Hospital, Satkhira

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Mr Razul Ahmed, Health Assistant

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Ms Minoti Samadder, Programme Organizer (Laboratory), BRAC

TB patient

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Pabna CDC

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Dr Tahsin Aziz, Medical Officer

Khandokor Mashiur Rahman, District Coordinator, LEPRA

Md. Osman Goni, Programme Organizer, LEPRA

Md. Ataur Rahman, Social Mobilizer, NATAB

TB patient

Mohanpur UHC, Rajshahi

Dr Jamal Uddin Sk, UH*FPO

Mr Himangshu Kormokor, Project Director, Damien Foundation

Mr Sebastian, TLCA, Damien Foundation

Mr Nayan Kumar Shaha, TLCA, Damien Foundation

Md. Hashem Ali, Village Doctor

Rajshahi Medical College Hospital

Col. Md. Abdul Latif, Director, Rajshahi Medical College

Dr Nazmul Huda Somon, Resident Physician

Md. Delwar Hossain, Sr TLCA, Damien Foundation

Md. Zakir Hossain, TLCA, Damien Foundation

TB patient

Office of the Director (Health), Rajshahi

Dr Md. Nurul Islam, Director (Health)

Rajshahi CDH

Dr Md. Amanullah Chowdhury, Medical Superintendent

Ms Regina, Nurse, MDR-TB ward

Mr Ripon, In-charge, MDR-TB ward

Ms Sultana Parveen, Med. Tech. (Lab.), RRL

Dr Saiful Islam, MDR-TB Coordinator, Damien Foundation

Mr Anil Kawria, Sr Laboratory Technician, RRL, Damien Foundation

Mr Angelus Tudu, Sr Laboratory Technician, RRL, Damien Foundation

Civil Surgeon Office, Rajshahi

Dr Md. Jahurul Islam, Civil Surgeon

Caritas Sick Assistance Shelter, Rajshahi

Sr Drechmen, Sister-in-charge

Naohata Urban Clinic (Tilottoma, SSFP), Rajshahi

Ms Morsheda Morshed, Project Director

Md. Abu Saleh, Monitoring Officer

Manda UHC, Naogaon

Dr Md. Monirul Huq, UH&FPO

Manda FWC, Naogaon

Mozammel Huq, Medical Assistant

TEAM VI: Rangpur division

Kaliakoir UHC, Gazipur

Dr Mainul, Medical Officer (Disease Control) and UH&FPO in-charge

Dr Anwarul Haque, Dental Surgeon

Md. Ruhul Amin, Storekeeper

Md. Muniruzzaman, Med. Tech. (lab)

Tariq Ahmed, Med. Tech. (lab)

Momtaz Begum, Programme Organizer (Laboratory), BRAC

Dr Shahina Akhter, Medical Officer (TB/leprosy), Gazipur

Md. Fazlul Ahsan Mridha, Programme Organizer, Gazipur

Md. Adus Sobhan, District Manager, (Gazipur), BRAC

Md. Abdul Hai, Upazila Manager (Kaliakoir), BRAC

Sirajgonj CDC

Dr Md. Nurul Islam, Civil Surgeon

Dr Kalyan Kumar Shaha Podder, Jr Cons.

Dr Md. Ahia Kamal, Medical Officer

Ramiz Uddin Ahmed, Programme Organizer

Md. Anwar Hossain, Med. Tech. (Lab.)

Mr Utpol Kumar, Pharmacist

Md. Ruhul Amin, Med. Tech. (Radiography)

Md. Shah Alam, Asst Nurse

Md. Azad Rahman, District Coordinator, LEPRA

H M Abdul Hannan, Field Organizer, LEPRA

Mr Sarabindub Kapri, District Field Officer, LEPRA

Md. Debashish Saha, Programme Organizer, LEPRA

Md. Abdul Bari, MIS Assistant

Civil Surgeon office, Rangpur

Dr Md. Motiur Rahman, Director (Health)

Dr Md. Rezaul Karim, Civil Surgeon

S M Liaquat Hossain, Programme Organizer

Rangpur Medical College Hospital

Dr Dipak Lal Banik, Director

Dr Ahsan Habib, Medical Officer (DOTS coordinator)

Md. Mahabubur Rahman, Programme Organizer (Laboratory) BRAC

Rangpur CDC

Dr Minhajul Islam, Jr. Cons.

Dr Laila Arzuman Banu, Medical Officer

Md. Ahsiquar Rahman, Med. Tech. (Lab.)

Md. Imam Uddin, Sr Health Coordinator, BRAC

Md. Shajahan Ali, District Manager, BRAC

Md Maksudar Rahman, District Manager, BRAC

Shaikh Ramjan Ali, Quality Control Officer, BRAC

Rangpur Segregation Hospital

Dr Paritosh Das Gupta, Medical Officer

Dr Md. Ibrahim, Medical Officer

Office of the Civil Surgeon, Kurigram

Dr Golam Mostofa, Civil Surgeon

Dr Moudud Hossain, UH&FPO, Kurigram Sadar

Md. Atiqul Islam, District M&E Officer

Sadar Hospital, Kurigram

Dr K K Paul, Resident Medical Officer

Dr Ajoy Kumar Roy, Consultant Medicine

Dr Nazrul Islam, Consultant Paediatrics (in-charge)

Dr Ranju, Emergency Medical Officer

Ms. Iffat Ara Laboni, National Service Staff, RDRS

Mr Wahab Mondol, TLCA, RDRS

Ms Khadija Akhter, TLCA, RDRS

Mr Abdullah Al Masud, Laboratory Technician, RDRS

Kurigram CDC

Dr Aminul Islam, Jr Cons. (in-charge)

Dr Rezina Begum, Medical Officer

Khondokar Md. Siddique Alam, Pharmacist

Md. Altaf Hossain, Med. Tech. (Radiography)

Md. Hafizur Rahman, Med. Tech. (Lab.)

Ms Rani Chowdhury, Lady home visitor

Ms Motium Begum,

Ms Mina Rani Goala, National Service Staff, RDRS

Ms Afroza Khatun, National Service Staff, RDRS

Ms Moslema Khatun, National Service Staff, RDRS

Ms Kawsar Begum, National Service Staff, RDRS

Md. Abdul Majid, National Service Staff, RDRS

Ms. Shanur Begum, National Service Staff, RDRS

Md. Rafiqul Islam, National Service Staff, RDRS

Ms Nasrin Begum, National Service Staff, RDRS

Mithapukur UHC, Rangpur

Dr Shah Md. Wajed Ali, UH&FPO

Ms Bilkis Khatun, Med. Tech. (Lab.)

Md. Omar Faruque, Med. Tech. (Lab.)

Md. Anisur Rahman, TLCA

Ms Shyamoli Perveen, Programme Organizer (Laboratory), BRAC

Kathali Community Clinic, Mithapukur, Rangpur

Abdus Sobhan, Health Inspector, Mithapukur

Md. Raheb Ali Pradhan, Durgapur, Mithapukur

Mr. Aminul Islam, Health Assistant, Durgapur, Mithapukur

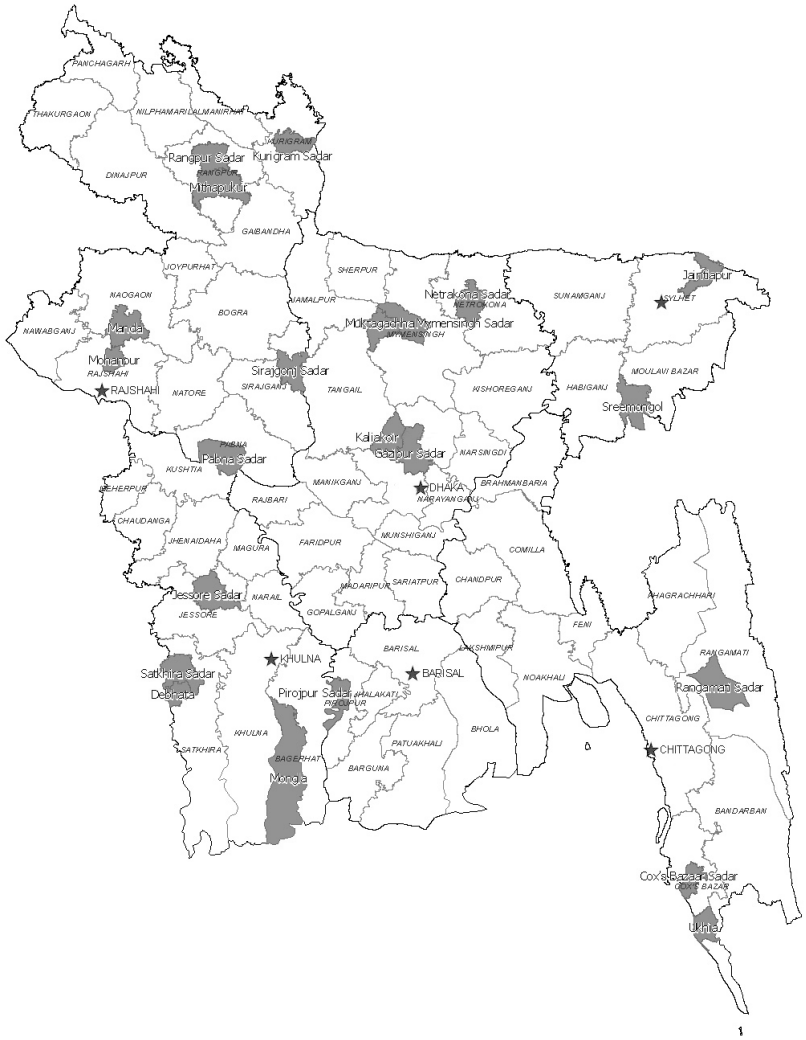
Ms Arifa Yeasmin, Programme Organizer, BRAC (Durgapur)

Ms Ismat Ara, *Shasthya Shebika*, Kathali, Durgapur,

Ms Rahena Begum, *Shasthya Shebika*, Kathali, Durgapur

Annex 4

Map indicating *upazilas* and metropolitan cities visited



The fifth review of the Bangladesh National Tuberculosis Control Programme took place from 2 to 12 October 2010. A team consisting of international and national reviewers including NTP staff, TB experts, public health experts, donor representatives and other stakeholders reviewed programme documents, visited various parts of the country and interviewed key informants in order to get first-hand experience of TB control in Bangladesh.

The partnership approach and the availability of significant amounts of donor funding together with the leadership role played by the Government of Bangladesh are the basis of the success of the programme. This has resulted in achieving set programme targets and successful implementation of different components of the programme.

The introduction and scale-up of new tools and the expansion of specific programme areas (such as management of drug-resistant tuberculosis, TB/HIV, engaging the private sector and strengthening the overall health system) pose new challenges. Provided adequate support is made available, the review team believes NTP is in a position to address all challenges.

World Health Organization
Country Office for Bangladesh

SEA-TUB-45