SEA-TB-307
Distribution: Restricted

National Tuberculosis Control Programme, Bangladesh

Report of the Fourth Joint Review
17–28 October 2007

WHO Project: BAN TUB 06

World Health Organization
Regional Office for South-East Asia

Printed in India

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Annexes

Acronyms

A	amikacin
ACSM	advocacy, communication and social mobilization
BMA	Bangladesh Medical Association
BPMA	Bangladesh Private Medical Association
C	clofazimin
CCM	Country Coordination Committee
CDC	chest disease clinic
CIDA	Canadian International Development Agency
CMSD	Central Medical Supplies Depot
DGHS	Directorate-General of Health Services
DOT	directly observed treatment
DST	drug-susceptibility testing
E	ethambutol
EPZ	export processing zone
EQA	external quality assessment
ERD	Economic Relations Division
Eth	ethionamide
FDC	fixed-dose combination
G	gatifloxacin
GDF	Global Drug Facility
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GLC	Green Light Committee
H	isoniazid
HEED	Health, Education, Economic Development (NGO)
HIV	human immunodeficiency virus

HNPSP	Health, Nutrition and Population Sector Programme
HPSP	Health and Population Sector Programme
HRD	human resources development
ICDDR'B	International Centre for Diarrhoeal Diseases Research, Bangladesh
IPRSP	Interim Poverty Reduction Strategy Paper
ISTC	International Standards for Tuberculosis Care
K	kanamycin
LEPRA	Leprosy Relief Association (NGO)
LTCA	leprosy and TB control assistant
LTCC	Leprosy-TB Coordinating Committee
MBDC	Mycobacterial Disease Control
MDGs	Millennium Development Goals
MDR-TB	multidrug-resistant tuberculosis
MoH&FW	Ministry of Health and Family Welfare
MoU	memorandum of understanding
NASP	National AIDS and STI Programme
NATAB	National Anti-TB Association of Bangladesh
NGO	nongovernmental organization
NIDCH	National Institute of Diseases of Chest and Hospital
NSDP	NGO Service Delivery Project
NTP	National Tuberculosis Control Programme
NTRL	National Tuberculosis Reference Laboratory
O	ofloxacin
OPD	outpatient department
PPM	public-private, public-public or private-private mix
R	rifampicin

RDRS	Rangpur-Dinajpur Rural Service (NGO)
SEARO	Regional Office for South-East Asia
SOPs	standard operating procedures
SRL	supranational reference laboratory
SWAp	sector-wide approach
TB	tuberculosis
Tk	Bangladesh Taka
UHC	*upazila* health complex
UH&FPO	*upazila* health and family planning officer
UPHCP	Urban Primary Health Care Project
URC	University Research Co. LLC
US$	United States dollar
WHO	World Health Organization
Z	pyrazinamide

Executive summary

This report provides the findings, conclusions and recommendations of the fourth review of the National Tuberculosis Control Programme (NTP) of Bangladesh. This joint review is based on the evaluation of programme performance since the third review held in September 2004. Recommendations are related to the implementation of the Stop TB strategy during the period 2008-2010 aiming at achieving the Millennium Development Goals (MDGs) by 2015.

The NTP is the designated lead agency to address tuberculosis control. Partners have been officially involved in it since 1993.

Tuberculosis (TB) remains a major public health problem in Bangladesh. The World Health Organization (WHO) estimated that in 2005 there were approximately 576 000 TB cases in the country. The number of new cases occurring in 2005 was estimated at approximately 322 000. Of these, approximately 145 000 were infectious cases transmitting TB in the community. WHO further estimated that about 67 000 TB patients, most of them not registered, had died of tuberculosis in 2005.

A national TB prevalence survey combined with an infection prevalence survey was begun in 2007. Results of this survey, expected in 2009, will provide more precise data on the current size of the TB burden as well as the levels of its transmission.

Achievements

The case detection rate increased from 46% in 2004 to 61% in 2005 and 71% in 2006. The treatment success rate of new smear-positive cases registered in 2005 was 91%. The review team congratulated the NTP, including its partners, in achieving the two global targets in 2006.

Analysis of the case-finding data showed that the success of the programme is based on the involvement of a variety of health-care providers and community-based volunteers (such as village doctors, cured TB patients or *shasthya shebikas*[1]) in addition to government field-level staff,

[1] *Shasthya shebika:* female community health volunteer taking part in the BRAC health programme

as well as additional microscopy centres in rural and urban areas. The establishment of sputum collection centres at the union level has resulted in the identification of increasing numbers of suspects. It has also improved the access to diagnosis.

The overall increase in the case detection rate in 2004-06 is largely due to greater access to diagnosis facilities in areas where TB-control efforts were limited. In areas with effective TB control in place since 1993 the examination of greater numbers of suspects did not yield too many additional cases since many prevalent cases had already been detected earlier.

The increased service coverage was made possible by grants from the Canadian International Development Agency (CIDA) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). Anti-tuberculosis drugs needed for the treatment of the rising number of cases were provided with the support of the Global Drug Facility (GDF), GFATM and CIDA.

The Ministry of Health and Family Welfare (MoH&FW) endorsed the "Strategic Plan for TB Control 2006-2010". The objectives of the Plan are in accordance with the global targets for TB control and the TB-related MDG targets for 2015. The strategies and interventions of the Plan are grouped under the six elements of the global Stop TB strategy.

During the period under review the Memoranda of Understanding (MoU) between NTP and its partners were revised and expanded, thereby sustaining the strong levels of collaboration between the government and nongovernmental organizations (NGOs).

The programme management unit of the central level of the NTP was gradually strengthened since 2004. Currently the Mycobacterial Disease Control (MBDC) directorate and NTP central team have 15 positions of medical officer. WHO is providing technical support through 14 technical consultants and staff at the central and divisional level.

The network of diagnostic and treatment centres has been expanded in metropolitan cities, in *upazilas*[2] with large populations, in all military,

[2] *Upazila* or sub-district: This corresponds to the lowest level for coordination of health activities

police and *Ansar*[3] hospitals, and in prisons and a number of workplaces. In 2006 there were 703 microscopy centres. Thirty three external quality assessment (EQA) centres monitor the quality of the microscopy through blinded rechecking. The review team considers the overall performance and quality of the microscopy network and blinded rechecking as satisfactory.

During the period under review there was uninterrupted supply of drugs and reagents. The provision of drugs in the future is secured through donor fund commitments. The drug distribution system was found to be satisfactory.

A strategic plan and operational guidelines for advocacy, communication and social mobilization (ACSM) have been developed.

Guidelines for public-private mix (PPM) were also published.

The National Institute of Diseases of Chest and Hospital (NIDCH) and the Damien Foundation have provided second-line treatment to about 620 patients since 1997. A DOTS-Plus pilot project to diagnose and manage 700 patients over five years was approved by the Green Light Committee (GLC). A DOTS-Plus coordinating committee was established and DOTS-Plus guidelines finalized.

The Strategic Plan for TB Control 2006-2010 has identified TB/HIV collaboration as one of the major service delivery areas, and a National Forum for TB/HIV has been formed. The latest available data showed a consistently low HIV prevalence level in TB patients. Initiatives by NGOs for HIV awareness and voluntary counselling and testing (VCT) were available in city corporation areas and in some districts.

The programme has successfully applied to Round 3 (2003) and Round 5 (2005) of GFATM. The total lifetime budget amounts to US$ 88 million of which US$ 52 million has been approved. Total disbursements currently amounted to US$ 30 million. The total grant is being channelled equally through the Government and BRAC.

[3] *Ansar* or village defence force

The MBDC Directorate has established a Technical and an Implementing and Monitoring Committee for TB research. Priority areas for operational research were identified.

Constraints and challenges

A major challenge for the programme is to increase the detection of smear-negative and extra-pulmonary TB cases, which in 2006 totalled 17% and 10% respectively of the cases diagnosed. Similarly, management of TB in children has not received sufficient emphasis.

The number of relapses and other retreatment cases was below the expected level in many districts. Some of these areas were more recently covered. The history of previous treatment was not always properly assessed and recorded. Consequently previously treated patients may have been reported and treated as new cases.

The main challenges related to the drug management system were the inadequate storage facilities at the central level and the insufficient expertise in drug management at the central and peripheral levels. There was also a decrease in the level of government funding for the procurement of anti-TB drugs over the past three years.

While NTP has developed a national plan for ACSM, the current situation is characterized by limited collaboration for ACSM between the different partners, lack of baseline data and a culture of continuous programming rather than periodic intensive bursts of ACSM activities. Intensive ACSM bursts were deliberately not considered as the laboratory services could not cope with the expected sudden and substantial increase in the number of smear examinations. There was also no mechanism to regularly monitor and evaluate the impact of the ACSM activities.

Many essential TB programme posts in the chest disease clinics (CDCs) and *upazila* health complexes (UHCs) were vacant. This leaves the provision of basic TB programme activities and services, as well as of leadership and guidance, unfulfilled or dependent on NGO staff. Many of the government staff currently deputed in posts reported the need for TB training and better functional equipment to competently discharge their responsibilities. Additionally, there was no systematic monitoring of human resources development (HRD) needs.

As no nationwide drug resistance survey has been held the size of multidrug-resistant tuberculosis (MDR-TB) is not known. It is probable that the Category-2 regimen amplifies rifampicin resistance in Category-1 failures. The current capacity for hospitalization of patients on second-line treatment is limited. Laboratory capacity for culture and drug-susceptibility testing (DST) was still limited.

While tangible progress has been made in PPM initiatives in rural areas, there was insufficient collaboration in urban settings or with the corporate sector (the constraint being workplaces situated outside export processing zones (EPZs)), private hospitals and clinics, private practitioners, sellers of drugs and private laboratories. Private practitioners and drug-sellers were also not adequately aware of or versed with the NTP guidelines. There was also a need to further strengthen collaboration and partnerships with local government authorities and the NGOs concerned in urban settings.

The extent of TB/HIV co-infection is not correctly known. Guidelines for collaboration are also unavailable and NGO initiatives for TB/HIV collaboration need to be bolstered further.

Only a few cases of childhood TB were registered. The prevalence of tuberculosis among children was also unknown. While the national guidelines include a brief chapter on childhood TB, there were no programmatic guidelines for its diagnosis and treatment. Diagnostic facilities were not available in all districts and *upazilas*.

Supervisory plans of NTP, NGOs and WHO were not well or adequately coordinated. Supervision by government staff was hampered by transport and resource constraints. There were also concerns about the quality of supervision since feedback forms were not standardized and neither accompanied by any reports on action taken.

NTP was integrated into the general health system with substantial support from NGOs. This, however, left it vulnerable to system weaknesses. Issues such as staff management and quality control of their performance and service delivery require diligent attention in order to identify and fulfill the necessary skills-mix at various levels through a systematic HRD plan. Joint implementation of activities requires a review of the functioning of NGO and government staff with a view to maximizing the comparative

advantages of each and fully realizing the stewardship role of the government. Leadership, programme, and specifically, financial management training is required. A review of the mechanisms with a view to streamline fund flow – including to the district level – may be required. Overall health systems strengthening could be addressed through the opportunities presented by GFATM.

Though the programme was successful in attaining extensive GFATM grant support, the flow of funding was constrained by inter-ministerial procedures. There was also delay in reporting and different audit mechanisms of GFATM funds. The system to facilitate the transfer of funds to the district level through the existing network is only partially used by NTP.

Recommendations

Diagnosis

The NTP should strengthen collaboration with hospitals, medical colleges and specialists to increase diagnosis of smear-negative, extra-pulmonary and childhood TB. Adequate services for chest X-ray examination at the *upazila* and district level, including training of resident medical doctors in X-ray reading, should be set up.

Laboratory

The quality of the National Tuberculosis Reference Laboratory (NTRL) should be improved to match international standards with support from the Bangkok Supranational Reference Laboratory (SRL) by the end of 2008. Three additional culture facilities should be established in a phased manner over the next three years. The NTP may consider adopting the two-sputum policy for diagnosis after analysing the differences in yield, sensitivity and specificity of two-versus-three sputum examinations in different settings.

Treatment

Strong emphasis should be placed on history-taking and proper classification of cases. The different retreatment categories should be included in the quarterly case-notification report.

Drug management

Standard operating procedures (SOPs) should be introduced for drug supply management. All relevant NTP and NGO staff should be trained in drug supply management. Adequate space for TB drugs should be ensured in the government warehouse complex currently under construction. Sufficient funding to procure anti-TB drugs after the termination of the GDF grant should be identified.

ACSM

A long-term, multi-level, integrated TB ACSM strategy should be developed to build ACSM capacity, mobilize support and achieve measurable and sustainable behaviour change. The national ACSM technical sub-committee should be strengthened. The Phase 2 ACSM programme should be planned, implemented and evaluated by the end of 2008.

Human resources

The NTP should work in tandem with the Directorate-General of Health Services (DGHS) to fill essential TB programme posts with trained personnel. The NTP should assess HRD needs down to the CDC and UHC levels as well as the quality of training courses conducted at those levels. Medical staff from CDCs should be trained in management development, team building and leadership. The National Strategic HRD Plan should be finalized and implemented.

Drug-resistant tuberculosis

Further development of MDR-TB should be prevented by correct categorization of patients; regular adherence to treatment; strengthening follow-up sputum microscopy services for detection; and by sensitizing different private health-care providers on issues related to development of drug resistance. Laboratory capacity should be built to support MDR-TB management and the planned national drug-resistance survey. Capacity should also be enhanced for the programmatic management of MDR-TB.

PPM

The NTP needs to actively engage with different medical societies using the International Standards for TB Care (ISTC) and National PPM Guidelines as tools. Collaboration with industries and pharmacy-holders through their respective associations should be expanded. A monitoring system to supervise and evaluate PPM activities by different partners should be established. Formal linkages between NGOs, NTP and public and private sector health-care providers should be strengthened.

TB/HIV

A "National HIV Prevalence Survey among TB Patients" should be carried out every two to three years. National guidelines for functional collaboration between the TB and HIV control programmes should be developed. Ongoing collaboration between NTP and the National AIDS and STI Programme (NASP) should be strengthened.

Childhood TB

A national workshop to review and finalize guidelines for diagnosis and management of childhood TB should be organized. All Medical Officers (Disease Control), paediatricians and CDC consultants should be trained on the standardized diagnosis and treatment of TB in children.

Monitoring and evaluation

Joint supervision and monitoring visits by representatives of the government, NGOs and WHO should be promoted. An internal review by NTP, WHO, NGOs and experts should be conducted in the years when there is no external review. The government should designate a full-time medical officer (TB/leprosy) in districts where there is no CDC.

Health systems strengthening

Strengthening of the health system for TB should focus on ensuring basic infrastructure for TB control services, particularly X-ray facilities and transport.

Financing

Donor support to TB control activities should be sustained over the next years to be on track for achieving the MDGs. Capacity should be built within the NTP finance unit to satisfactorily execute their roles of planning and timely reporting as per donor requirements and to reduce dependence on WHO for the financial management of GFATM funds. A full-time finance officer should be posted in the NTP finance unit.

Operational Research

Findings of operational research should be documented timely and disseminated to policy-makers, (potential) donors and health planners to develop new approaches towards more effective TB control.

1. Introduction

In 1965, TB services in the erstwhile province of East Pakistan (now Bangladesh) were mainly curative and based in 44 TB clinics, eight segregation hospitals and four TB hospitals. TB services were expanded to 124 UHCs during the Second Health and Population Project (1980-86) under the "Strengthening TB/Leprosy Control Services" programme and were operationally integrated with leprosy during the Third Health and Population Project (1986-91) under the MBDC directorate. A study by the World Bank in 1990 reported that less than 40% of the patients were completing their treatment and less than even 10% of the estimated cases were being detected in Bangladesh.

The revised NTP adopted the DOTS[4] strategy during the Fourth Population and Health Plan (1992-1998) under the project "Further Development of TB/Leprosy Control Services". The project, costing about US$ 14 million, was financed by the Government of Bangladesh, the Government of the Netherlands and the International Development Agency/World Bank consortium. WHO provided technical assistance as well as supported training, selective procurement, monitoring and evaluation. The NTP launched its field implementation in November 1993 and progressively expanded to all *upazilas* by June 1998. Between 1998 and 2003 the NTP operated under the Health and Population Sector Programme and was integrated into the communicable disease control area of the Essential Services Package under MoH&FW. Since January 2003, the NTP coverage, including in the metropolitan cities, has been 99%.

Within the broader context of the Bangladesh National Strategy for Economic Growth, Poverty Reduction and Social Development [Bangladesh Interim Poverty Reduction Strategy Paper or IPRSP (March 2003)], the HPSP was renamed "Health, Nutrition and Population Sector Programme

[4] DOTS: First component of the Stop TB strategy, consisting of five elements: political commitment with increased and sustained financing; case detection through quality-assured bacteriology; standardized treatment with supervision and patient support; effective drug supply system and management; and monitoring and evaluation system with impact measurement.

(HNPSP)". The NTP continued its activities under a reinstated separate directorate for mycobacterial disease control.

The NTP accommodated the recommendations of the reviews of 2001 and 2004 in its strategic plans and implemented the same. The case-detection rate had reached 71% in 2006 and treatment success notched a high of 91% (2005 cohort), thus surpassing the global targets. The DOTS expansion also included the corporate sector as well as prisons and health facilities belonging to or used by the uniformed services. Regional laboratories providing EQA services were established and PPM initiatives were piloted.

2. Goal, objectives and methodology of the review

Goal

The overall goal of this Review was to undertake a comprehensive appraisal of NTP and provide recommendations to implement the new Stop TB strategy and Global Plan to Stop TB with a view to meet the MDG targets in Bangladesh by the year 2015.

Objectives

The objectives of the Joint Review were to:

- Review the current NTP structure, policies, procedures;
- Assess measures taken by NTP and its partners to increase and expand DOTS;
- Assess the financial resources for the programme including GFATM;
- Assess the smear microscopy, EQA and drug-resistance surveillance;
- Evaluate drug procurement, storage, distribution and dispatch;
- Assess recording, reporting, monitoring and evaluation procedures;
- Assess HRD for delivering TB services;

- Advise on social mobilization for increased public awareness and increasing case detection; and
- Advise on the management of drug-resistant tuberculosis and TB/HIV.

Methodology

The Joint Review took place with the full support of the MoH&FW. Technical assistance was provided by WHO with the cooperation of international and national reviewers. National reviewers included programme staff (government and NGO) 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).

The TB Technical Sub-committee of the Country Coordination Mechanism (CCM) acted as the overall Review Committee to guide and facilitate the review/planning process and finalize the plan of action for the review.

The review included five separate field visits to a number of sites across the country, including a special assignment as part of the annual GDF Monitoring Mission. The districts were pre-selected and assigned to the teams. Within a district it was left to 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. Back from the field sites, the team's 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 at Annex 3.

Technical discussions took place on the last two days of the review. The review team leader and select members debriefed the Honourable Adviser to MoH&FW and the WHO Representative.

3. NTP goal, objectives and structure

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

The NTP aims to strengthen the efforts towards TB control through effective partnerships and mobilization of resources and by ensuring quality diagnostic and treatment services under defined DOTS strategy. The services should be equally available to all the people of Bangladesh irrespective of age, sex, religion, ethnicity, social status or 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 reach and thereafter 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 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 to all TB patients;
- Engage people with TB and affected communities; and,
- Promote operational research.

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) and two Assistant Directors (one for TB and one for leprosy). The NTP is headed by the NTP Manager, who reports directly to the Line Director (TB/leprosy). The project function of the Line Director is executed by the Director of MBDC. The NTP is responsible for all planning, management and delivery of health-care services. The MoH&FW also coordinates with other relevant ministries such as Finance, Local Government and Rural Development, Labour and Manpower, and 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 six medical officers who report to the Programme Manager and have been designated as focal points for epidemiology; laboratory, drug-resistance surveillance and DOTS-Plus; ACSM; TB/HIV; PPM and training; and procurement and logistics.

There are no 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 Medical Officer who is designated for TB (and leprosy) full-time and/or a Programme Organizer (TB/leprosy). Junior consultants are in charge of the chest disease clinics 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 towards TB control. The city corporations also have a limited number of health staff. They are not systematically involved in TB control activities.

Additional support is provided through a network of WHO national consultants. They include one long-term International staff, two National Professional Officers, technical consultants and administrative support staff based in Dhaka, and field consultants for each division of the country. Services delivery is mainly supported by NGOs, including specialized TB NGOs as well as NGOs undertaking a broad range of health and development activities. Interagency coordination in Bangladesh is satisfactory with a broad range of NGOs assisting in programme implementation.

4. Epidemiology and case detection

Estimated disease burden

In the absence of recent representative epidemiological data it is difficult to assess the exact burden of tuberculosis in Bangladesh.

The NTP, in collaboration with the International Centre for Diarrhoeal Diseases and Research, Bangladesh (ICDDR'B), started a TB prevalence survey combined with an infection prevalence survey in 2007. The results of this survey, expected in early 2009, will provide more precise data on the current size of the TB burden and the levels of its transmission.

The latest WHO estimates (2005) of the TB incidence, prevalence and mortality are summarized in Table 1.

Table 1: *WHO estimates on TB in Bangladesh (2005)*

	Number of cases	**Percentage or rate per 100 000 pop. (95% confidence interval)**	
Incidence of all TB cases	321 936	227	(165-294)
Incidence of new smear-positive TB cases	144 658	102	(73-135)
Prevalence of all TB cases	575 797	406	(286-542)
TB mortality	66 656	47	(33-64)
Adult (15-49 yrs) TB cases that are HIV-positive	n.a.	0.1%	(0-0.1)
MDR among new cases of TB	5 800	1.8%	(0.3-9.7)

Source: WHO Report 2007 – Global Tuberculosis Control

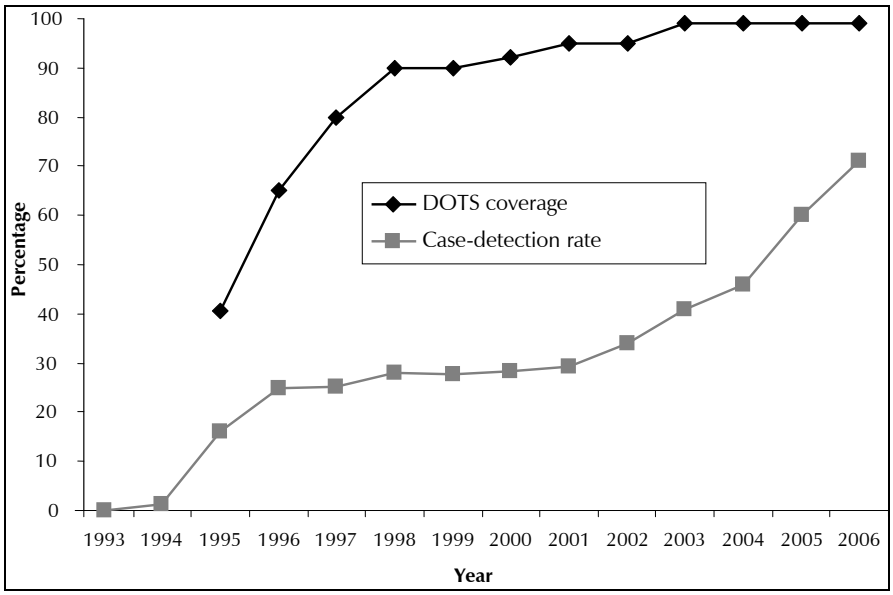
In areas supported by the Damien Foundation, the MDR-TB rate among retreatment cases ranged from 5% in Category-1 relapses to 80% in Category-2 failures.

DOTS coverage and case detection

Following the introduction of the DOTS strategy in 1993, the case-detection rate for new smear-positive cases has increased gradually to reach 28% in 1998. Only marginal progress was achieved till 2001 in terms of further increasing the case-detection rate. This may be explained by the health sector reforms which resulted in the virtually disappearance of TB as a separate national programme, as well as the contemporary uncertainties in funding. From 2001 onwards case detection has accelerated to reach 46% in 2004 and further up to 61% in 2005 and 71% in 2006, thereby

reaching the global target (Figure 1). DOTS coverage was reportedly pegged at 99% since 2002.

Figure 1: ***Progress in DOTS coverage and case detection under DOTS, 1993-2006***



Source: NTP data

Of the total number of 145 186 cases reported to NTP in 2006, 82% were reported from the *upazilas*, 13% by units located in the metropolitan cities and 5% by CDCs. Just over 70% were new smear-positive cases and almost 3% were relapses. New smear-negative and extra-pulmonary cases were 17% and 10%, respectively. The proportion of extra-pulmonary and new smear-negative cases were higher in the metropolitan cities and CDCs compared to the *upazilas* (Table 2). This is not surprising since only limited diagnostic facilities to detect smear-negative or extra-pulmonary cases are available at the *upazila* level. Childhood TB represents 1.5% of new smear-positive patients and 6.5% of smear-negative and extra-pulmonary TB cases. Smear-negative and extra-pulmonary patients and childhood TB are certainly under-diagnosed within the NTP.

Table 2: *Case notification by type of reporting unit, 2006*

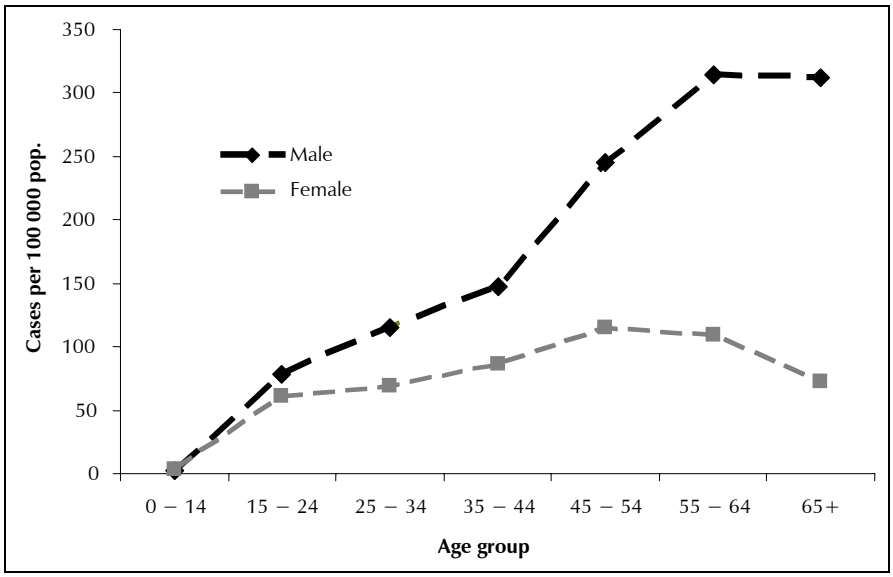
Reporting unit	Pulmonary positive				New pulmonary negative		New extra-pulmonary		Total	
	New cases		Relapse cases							
	Number	%	Number	%	Number	%	Number	%	Number	%
Upazila	89 729	75.5%	2 644	2.2%	16 722	14.1%	9 735	8.2%	118 830	82%
Metropolitan city	9 219	47.9%	1 267	6.6%	5 304	27.6%	3 469	18.0%	19 259	13%
CDC	3 040	43.0%	299	4.2%	2 493	35.2%	1 243	17.6%	7 975	5%
Total	**101 988**	**70.3%**	**4 210**	**2.9%**	**24 519**	**16.9%**	**14 447**	**10.0%**	**145 164**	**100%**

Source: NTP Annual Report 2007

Age and sex distribution of new smear-positive cases

Of the 101 988 new smear-positive cases reported in 2006, 67% were male. The male–female ratio was estimated at 2.1:1. The number of male cases was found to be higher in all age groups except for children less than 15 years old. Almost three-quarters of the reported cases were aged between 15 and 54 years. As shown in Figure 2, the notification rates increase with age for both sexes and appear to decrease in people above 65 years.

Figure 2: ***Notification rate for new smear-positive pulmonary TB classified by age and sex, 2006***



Case-detection rate

The case-detection rates for new smear-positive patients, calculated as a percentage of the estimated number of cases occurring in a given population in one year, were deduced for the country as a whole and also for every district and *upazila*.

The calculation of the case-detection rate at the sub-national level (district/*upazila*) is inappropriate for the following reasons:

(1) The TB incidence estimate, with a rather wide confidence interval, is valid for the country as a whole;

(2) There will be differences in TB incidence between and within districts;

(3) Areas with recent DOTS expansion detect incident and prevalent cases, while those with effective DOTS implementation for several years detect mainly incident cases;

(4) Staff may be blamed for not reaching the target and unnecessary measures to artificially increase the case-detection rate may result.

Recommendations

The following recommendations were made:

- The NTP should bolster collaboration levels with hospitals, medical colleges and specialists to increase the quantum and frequency of diagnosis of smear-negative, extra-pulmonary TB and TB in children.
- Adequate services for chest X-ray examination at the district and *upazila* level should be ensured. These should include training of medical officers (disease control) and resident medical doctors in X-ray reading.
- Calculation of case-detection rates at the district, *upazila* or city level should be discontinued.
- DOTS coverage should be defined as 100% since all administrative areas have DOTS services.

5. Diagnostic and laboratory services

Diagnostic services

The NTP has developed a large network of laboratories providing microscopy services with good access and equity. At the time of the review, the network consisted of 703 microscopy centres with good collaboration between the Government and NGOs. Each microscopy centre serves a population of approximately 200 000 in rural areas and 80 000 in urban areas. A total of 3.02 million smears were examined in 2006. The slide positivity rate was 9%. There are four culture facilities in the country linked to NTP, one of which exclusively undertakes research.

The NTP has started reporting number of suspects screened. Data are expected to be available from 2007 onwards. Attendance in general out-patient departments varied widely at centres visited, with heavy utilization in rural UHCs. Diagnosis under NTP is free of charge for all patients. Specialist services are available in some UHCs. A small fee (five Taka) is charged from all new patients registering in the out-patient department (OPD). All TB staff in UHCs who work in the OPD and in microscopy laboratories have a good degree of knowledge about the symptoms of TB. They are, however, not aware of how many suspects need to be screened per 100 000 population. Patient delays in accessing TB treatment and provider delays in initiating treatment have been assessed by the NTP and NGO partners in limited settings in recent years.

Case detection of pulmonary smear-negative and extra-pulmonary TB appears to be insufficient. This may be due to various reasons such as prevalent attitude, knowledge and skills of referring physicians, extent of involvement of the private sector in TB case-finding, or non-availability of other modalities of testing in rural areas. X-ray facilities existed in most UHCs visited, but were often not functional. Suspects testing negative for three sputum samples did not always show records of a repeat sputum testing in the same laboratory although it is part of the diagnostic algorithm. In rural areas, the poorly developed private medical sector infrastructure and limited access to other diagnostic procedures (fine-needle aspiration cytology/ultrasound) may be an impediment for detection of extra-pulmonary cases. In referral centres such as NTRL there is ample detection of such cases. Contact tracing of children of smear-positive patients was not routinely done at the centres visited.

There is a likelihood of inaccurate categorization of cases as very few re-treatment cases are being detected in rural areas. Doctors interviewed in rural UHCs stated that history-taking was complete with regard to intake of anti-TB drugs. This may point to an inferior quality of history-taking.

There are outreach sputum collection centres in many remote areas. The NTP has requested the partner NGOs and other implementing agencies that if any laboratory serves a population of more than 200 000 then an additional facility has to be operated in that area. In addition, NGOs operate daily or run intermittent fixed sputum collection centres or organize periodic sputum camps in more remote areas.

Laboratory services

The quality of sputum smear microscopy in UHC laboratories with the EQA system in place was mostly good. In most microscopy centres, well-ventilated rooms with adequate space were available. Three samples (spot-morning-spot) are tested for diagnosis and one sample is tested for follow-up. In a number of cases, only one smear was examined with treatment being started in case this single smear was found to be positive.

Slides and sputum containers were regularly supplied by NTP. No shortage in laboratory consumables was observed. New and unscratched slides were available universally. Items such as diamond marker pen and filter paper were also available. NTP has supplied good quality binocular microscopes (model Olympus CX21) throughout the country although these were not properly maintained in a few laboratories. All centres visited had optimum supply of electricity. In some rural areas, though, the supply of electric power is a constraint in the use of binocular microscope. Annual maintenance contracts for the microscopes, although considered under the GFATM Round 5 proposal, were not yet in place.

The laboratory technicians could explain to the patients how to produce a good sputum sample. The smear size is as specified in the laboratory manual. However, a large proportion of smears was prepared from saliva. Smearing technique needs to be improved in several centres to make the smears more even.

A low proportion of positive results in follow-up cases was observed in several areas, whereas a positivity rate similar to the smear positivity rate

recorded during diagnosis is expected among follow-up cases too. A low proportion of scanty results was also observed in some laboratories.

The sputum requisition forms are being filled by the staff in the DOTS corner and not by the medical officer although there is no reason to believe in a drop-out of cases at this stage. In many instances the date of request is entered in the Laboratory Register with the result being available on the same day. Most of these patients were referred by outreach workers and therefore come with the first spot and morning samples. There were no primary defaulters in any of the centres visited. The number of patients in the Laboratory Register tallied with the number of patients in the TB Register. Both these records are usually maintained at the same institution. The TB Laboratory Registers are usually well maintained and sometimes detailed even the specific interval of examination of the follow-up specimens. All microscopy units visited had standard operating procedures (SOPs) displayed and these were followed in correct fashion. Internal quality control, however, is not routinely performed in many laboratories

Except for nine AFB laboratories, all laboratories are quality assured by 33 EQA centres in the country, all supported by NGOs. Blinded rechecking is performed by the EQA centre staff (first controller). Panel testing has not been implemented while on-site evaluation has not been effectively carried out in all places. Lot Quality Assurance Sampling was the methodology of sampling and the acceptance number was '0'. A sample size of five slides per month for each lab is used universally. Discordant slides are rechecked by a second controller. This second controller is a different laboratory technician in the same or different NGO laboratory or Shyamoli CDC laboratory where only discordant slides from EQA centres are re-checked. Feedback from Shyamoli CDC reaches the peripheral laboratories after several weeks or even months.

Laboratory workers were aware of issues related to TB infection control. Sputum is collected in an open area and all the instructions are adhered to. Five per cent phenol was available but this was only used as a disinfectant for cleaning surfaces after smearing. Chemical disinfection of microscopy wastes prior to disposal is not being carried out in any of the centres visited and neither is it a policy of NTP. Some centres had incinerators whereas in others the biomedical wastes are burned in the open. After burning/incineration, the remains of the waste are dumped in disposal pits. Many of these pits are uncovered. Staff handling this waste were not aware of segregation of wastes.

Recommendations

The following recommendations were made:

- Standardization and quality assurance of laboratory reagents, especially of carbol fuchsin, is required to provide consistent results. It is also advisable to have an internal quality control check of each batch of laboratory consumables prepared.
- The Laboratory Manual should be revised in order to incorporate changes in the programme under EQA and infection control, and to elucidate procedures of repeat sputum testing for smear-negative TB suspects.
- All remaining diagnostic laboratories should be brought under the EQA system.
- Training of staff conducting laboratory supervision should include the elements of laboratory, EQA and NTP supervisory activities. The Laboratory Manual should also be revised to cover these aspects.
- Additional second controllers should be identified to reduce the time needed to provide feedback to peripheral laboratories and take corrective action.
- Vacant posts in peripheral laboratories should be filled. Human resource constraints in NTRL should be addressed with programme support as early as possible in order to start the proficiency testing of cultures.
- NTP should sign maintenance contracts for microscopes and consider introducing maintenance contracts for other laboratory equipment such as high-speed centrifuges, biosafety cabinets, etc.
- The quality of the NTRL needs to be improved so that it can provide the necessary support for the planned expansion of the culture network. However, this plan should be executed in a phased manner, ensuring good concordance results in proficiency testing as well as adequate mechanisms of recording and reporting and minimal contamination in each culture laboratory.
- All laboratories should segregate wastes, both sharps (slides) and non-sharps (sputum cups, bamboo sticks, etc) and dispose of them separately in covered disposal pits or through incineration.

- The NTP may consider adopting the two-sputum policy for diagnosis according to international guidelines.
- Attention should be paid to ensuring the quality of follow-up smear testing in peripheral laboratories. The positivity rate among follow-up smears may be systematically monitored.

6. Treatment

Treatment regimens

The NTP has revised the treatment regimens: all new smear-positive, smear-negative patients and extra-pulmonary patients will be treated with the same regimen: 2(3)(RHZE)/4(RH). Implementation will start early 2008. Fixed-dose combinations (FDCs) have been ordered.

The change to a daily treatment regimen during the continuation phase is expected to strengthen the collaboration between NTP and academicians and general practitioners.

FDCs for treatment of childhood TB were not available everywhere and in places where they were available, they were hardly used. Loose drugs constitute 5% of the total drug orders for the treatment of adults. They are intended for the management of patients with adverse drug reactions. It was observed that in some areas only a small quantity of these drugs which were available was used while in other areas there were shortages.

Retreatment

The number of retreatment cases, except relapses, is not known from the NTP quarterly case notification reports.

Available reports show retreatment cases varying between 14% and less than 5% to even less than 2%. Proper drug history may often not take place prior to categorization of the patients. Under-diagnosis or retreatment cases pose a substantial risk of development of MDR-TB.

Directly Observed Treatment (DOT)

Out-patient DOT is the general NTP policy. In rural areas DOT is provided by a variety of health-care providers and community-based volunteers. These include *shasthya shebikas*, village doctors, cured TB patients and community

opinion leaders such as religious leaders and teachers in addition to Government field-level staff. In urban areas DOT is usually facility-based.

It was observed that DOT is not being strictly adhered to in several places.

Preventive chemotherapy

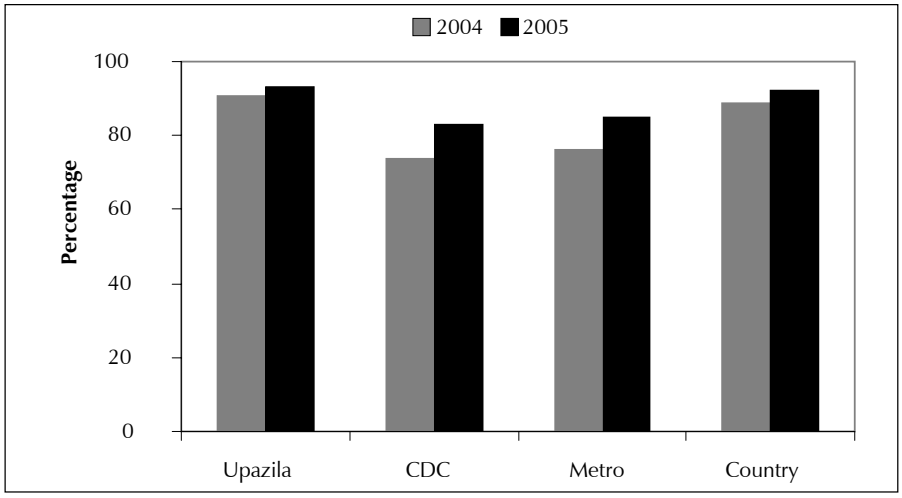
Though included in the NTP guidelines, preventive chemotherapy is routinely provided only by Damien Foundation and the TB project of the Leprosy Relief Association (LEPRA). Monitoring is done through the use of a "patient" treatment card.

Treatment outcome

The treatment success rate among new smear-positive patients reached 85% during 2003 and increased to 91.5% during 2005. The treatment success rate for relapses was 84% in 2005.

The treatment success of new smear-positive patients treated at *upazilas*, CDCs and in metropolitan cities during 2004 and 2005 is presented in Figure 3. This figure shows that treatment success has increased everywhere and is highest in the *upazilas*.

Figure 3: ***Treatment success rate among new smear-positive cases, 2004-2005 cohorts***



(Source: NTP Report, 2007)

Recommendations

The recommendations included the following:

- Childhood TB should be more widely and systematically managed. Paediatric drug formulations should be made available everywhere.
- DOT should be strictly adhered to. Government field-level staff should increasingly be involved in providing DOT.
- In all patients, the staff need to take proper history of previous drug intake to ensure that the correct treatment category is prescribed.
- The requirement for loose drugs should be reassessed and drug orders readjusted if applicable
- The NTP Manual should be revised to include the new regimens and new recording/reporting systems.

7. Drugs and supplies management

In accordance with NTP policy, all first- and second-line anti-TB drugs are provided free of charge to all registered patients. The central level of NTP is responsible for planning, limited procurement and distribution of first-line anti-TB drugs to its implementing partners (both governmental and nongovernmental). Single and loose formulations of drugs have been procured through the government's Central Medical Stores Depot (CMSD), while FDCs and paediatric formulations were provided by GDF as a grant in kind or procured through GDF using GFATM funding. Uninterrupted supply of drugs and laboratory reagents has been ensured over the last four years.

Anti-TB drugs were reportedly available throughout the country, which was confirmed in all places visited. The storage was adequately organized at the district and *upazila* level. Only limited amounts of drugs which had expired were reported. The storage of drugs and supplies at the central level was found unsatisfactory due to the limited space and lack of good warehouse practices. Stock management at all levels requires training of staff.

The programme will start shifting from an intermittent to daily regimen in 2008 subject to the stocks of RH 150/150. Although the exact magnitude and prevalence of TB in children was unknown, paediatric formulations had been distributed to most parts of the country. On account of unknown incidence rates and underdiagnosis of TB in children it is anticipated that a substantial portion of the paediatric formulations will expire.

As to second-line anti-TB drugs, the policy for procurement has not yet been implemented. Treatment of 700 patients over a five-year period was approved by GLC through GFATM funding. Second-line drugs are currently procured by the Damien Foundation using its own funds while the NIDCH receives funds from the Zakat Fund and Christian Service International for the same. Both projects are to be considered as part of operational research.

Anti-TB drugs of various quality and strength as well as different formulations are widely available in the local market and mostly dispensed without prescription. A first-line regimen for new patients would cost US$ 40 to US$ 60. Pharmacies visited by the review team in Khulna and Dhaka provided drugs to between 3 and 30 patients in a month with and without prescription.

The number of patients actually treated during the year, particularly Category-2 and paediatric patients, was much less than estimated. This led to and will continue to lead to expiration of drugs.

The government Essential Drug Company Limited has expressed its preparedness and interest for the production of anti-TB FDCs and requested GDF assistance for prequalification.

Recording and reporting practices varied from district to district and among the implementing partners. Nevertheless, no major discrepancies were found in records and reports from the central to the peripheral level or CMSD to the NTP central store. The currently drafted SOPs largely address the concerns of standardization of various forms across the programme.

The capacity of central unit of NTP and the implementing partners at various levels is inadequate to ensure appropriate planning, selection, procurement, distribution, use and management of drugs and supplies practices.

The total value of first-line anti-TB drugs procured for the programme for the year 2006 was US$ 835 652, of which US$ 1 725 047 was provided through GDF (grant and direct procurement using GFATM funds) and the remaining was contributed by the government. Government funding for the anti-TB drugs is showing a decreasing trend since donor contributions are increasing.

Recommendations

The reviewers made the following salient recommendations:

- Funding for the procurement of drugs and supplies after the second three-year GDF grant (which ends in 2008) should be identified.
- Adequate space for storing anti-TB drugs in the warehouse complex being constructed in Shyamoli should be obtained.
- More accurate estimates to calculate drug needs should be used.
- Non-related equipment should be removed from the store and drugs should be stored on proper pallets.
- Relevant NTP and NGO staff should be trained on drug supplies management.
- Finalize, introduce and implement SOPs for drug storage and distribution.
- Orient to and involve private pharmacies in delivery of DOTS in urban areas.
- Liaise with ACSM NGO partners and develop relevant posters on DOTS for pharmacies.
- The Government should consider to restrict the sale of anti-TB drugs in private pharmacies to prescription basis;
- The NTP should closely monitor the use of drugs that near the expiry date and restrict distribution of such drugs to the nearest health facilities only.
- The Government should request GDF to provide necessary assistance to the Essential Drugs Company Ltd in order to support the prequalification process.

8. Supervision, monitoring and evaluation

Observations

Quarterly coordination meetings take place at the district level and involve *upazila* staff and NGOs. Coordination meetings at the central level have taken place irregularly in the past year.

A supervision plan has been developed centrally down to the *upazila* level. The Medical Officer designated for TB/leprosy and/or the Junior Consultant of the chest disease clinic conduct supervisory visits starting from the district level. This is not always well coordinated, with duplication of activities or no supervision at all being in evidence sometimes. Transportation constraints have also impeded the effective conduct of supervision activities.

A comprehensive supervision checklist has been introduced. Written feedback reports on action taken in the aftermath supervisory visits were not seen in the areas visited by review teams.

NGOs conduct supervision of their own staff in dialogue with local health authorities. WHO consultants based at the divisional level also visit districts and *upazilas*. These visits are undertaken independently, although joint supervisory activities are sometimes conducted.

With regard to recording and reporting, all forms and registers were available at the sites visited. Recording is done completely manually. Compilation is done manually at the district level while some NGOs have introduced computerized systems within their projects. An electronic database is available at the central level while steps have been taken to introduce computers at the district level.

The NTP collects the globally standardized DOTS reports on a quarterly basis while a few indicators are also included in the integrated monthly health management information system. The NTP core indicators are reflected in the HNPSP annual performance report.

Recommendations

The reviewers made the following recommendations:

- Quarterly coordination meetings should be held regularly at all levels with optimum participation of all relevant stakeholders.
- Joint supervision/monitoring by government-NGO-WHO should be enhanced.
- Supervision plans at the local level need to be coordinated by the government, NGOs and WHO.
- Internal review by NTP, WHO, NGOs and in-country experts should be undertaken once a year, except in the year when there is a Joint Review.
- A summary sheet for specific recommendations should be included in the supervision checklist to be shared with the respective authorities.
- The new recommended reporting formats should be introduced, including reporting on retreatment cases and source of referral.
- A data management course should be organized for district TB managers.
- Medical Officers should be designated for TB/leprosy on full-time basis in districts without CDC.

9. Intersectoral collaboration and partnerships

Collaboration with NGO partners

The level and quantum of collaboration between the NTP and partners has been expanded. TB control activities in all districts, *upazilas* and metropolitan cities are now supported by NGOs. In relation to the expansion of the collaboration activity with NGOs, the NTP developed policies and issued guidelines for implementation. TB-specialized NGOs provide a strong technical base for the partnerships.

The MoUs between the NTP and its NGO partners were revised in 2006 with the aim of sustaining and expanding the strong levels of

collaboration between the Government and NGOs. The revised MoUs have helped avoid overlap in geographical working areas by the different partners.

Almost 100% of the country's population now lives in areas where DOTS services are available. The extensive NGO network participating in TB control activities has contributed to a significant increase in case detection and treatment success rates within a relatively short period of time. The contributions of *shasthya shebikas*, village doctors and other community members in the referral of TB suspects, as well as in DOT, have been significant. BRAC oriented over 67 000 *shasthya shebikas* for identifying TB suspects and providing DOT. The Damien Foundation oriented 15 475 village doctors in their working zones. All of them are contributing towards referring suspects while 6162 of the selected village doctors have been imparted enhanced training and perform as fixed-DOT providers. Other NGOs are also following similar approaches of using community volunteers, village doctors or pharmacists.

In addition, NGOs have extended their activities to capacity building and operational research. Examples include the training courses imparted by BRAC to other partners in development and financial management (including health-care financing and sustainability), social mobilization and communication. A number of operational research studies are also being conducted by partner NGOs. These studies are providing considerable support for policy formulation, planning, implementation and evaluation of TB control activities.

The partnership between NTP and NGOs has mutual benefits. Essential commodities such as drugs and diagnostics are provided by NTP. The government infrastructure and staff are available for NGOs and most NGOs organize their clinics inside government premises (UHCs, sadar hospitals, health centres, family welfare centres or medical college hospitals). NGO collaborative works contributed considerably to the expansion of diagnostic and EQA laboratories throughout the country.

With the introduction of a customized database, a more detailed analysis of sub-national data by the service provider was possible. This has allowed designing interventions targeting specific service-provider groups. However, there is a need to train staff on data management and analysis at the *upazila*, district and central levels to guide timely interventions.

Public-private, public-public and private-private mix

It can be said that the overall TB control programme is a large-scale PPM project where the NTP largely plays the role of a steward and where programme implementation is entrusted to NGOs.

The PPM approach for TB control is represented in various forms:

- Public with private (e.g. NTP collaborating with NGOs and the private sector)
- Public with public (e.g. NTP supporting TB services implemented in health facilities that come under different ministries: military hospitals, prison health centres, etc.)
- Private with private (e.g. NGOs working with private health practitioners).

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The various providers already involved in PPM activities or that can potentially be involved include the following:

- Institutional providers: NTP, NGO partners, City Corporation health services, academic institutions (such as medical colleges, specialized institutions, universities); other government hospitals (*sadar* hospitals, UHCs, chest disease clinics and hospitals); corporate sector/workplaces (factories based in EPZs, garment factories, port and railway hospitals, etc.); prison health services; military and police medical services; private hospitals and clinics; private laboratories; pharmacies and drug sellers.
- Individual providers: specialist physicians; graduate private practitioners; non-graduate private practitioners (e.g. sub-assistant community medical officers, medical assistants, village doctors; community health volunteers (e.g. *shasthya shebikas*, cured TB patients).

The NTP including partners have implemented numerous small- and large-scale PPM initiatives over time. Promising results are documented: DOTS with village doctors; DOTS with *shasthya shebikas*; DOTS in EPZs; and the Public-Private Partnership Project.

Public and private medical college hospitals have been incorporated into NTP. With support from partners, DOTS services are provided and

ACSM activities are conducted in these hospitals. All government and some private medical colleges, private hospitals, military hospitals, prisons and *sadar* hospitals are now linked to NTP. DOTS corners for outdoor and indoor TB patients have been established in the medical college hospitals. They have linkages with community DOTS centres.

Many private providers in Bangladesh are already providing services to TB patients. However, the TB management practices in the private sector are not standardized and the precise number of TB cases detected and treated in the private sector is not known. This is due to a lack of linkages between NTP, private practitioners, NGOs and public sector providers. The interest expressed by private practitioners during the initial period slowly waned, as can be observed from the significant decline in 2007 in the number of cases referred to DOTS centres by private practitioners (from 83 cases in 2006 to only 19 in 2007).

Pharmacists, who are the first point of contact for health care for many citizens of the low-income groups, are not yet directly linked with the NTP. Only a few NGO partners have established linkages with pharmacists on a pilot basis.

Some sections of the corporate sector/workplaces are linked with NTP. Their services include suspect identification, microscopy, diagnosis, treatment and DOT.

More collaboration is needed in urban settings and with the corporate sector in order to have a palpable impact on case detection and treatment success rates at the national level. Factors that have contributed to successful partnerships include mutual understanding among partners; trust; commitment; respect for each others' opinions; ideas and lessons from national and international experiences.

Beyond the formal agreements there also exists an important informal collaboration among the partners based on professional capabilities, interpersonal relations and frequent communication for problem-solving.

Recommendations

The following are the recommendations made by the reviewers:

- The NTP should actively engage with professional societies using ISTC and national PPM guidelines as a tool.
- Collaboration with industry and pharmacy-holders through their respective associations should be expanded.
- A monitoring system to supervise and evaluate PPM activities undertaken by different partners should be established.
- The interaction and formal linkages between NGOs, NTP and public and private sector health-care providers should be strengthened.

10. Health systems

The Government of Bangladesh recognizes TB as a major concern. Tuberculosis control was also included in the Essential Services Package of HPSP. The National Strategic Plan for TB Control is aligned with overall goals for health and poverty reduction in the National Health Master Plan. Long-standing and successful collaboration with a number of NGOs has been established. Many sustainable community-based initiatives to complement facility-based services are also in place.

The NTP is highly integrated into the general health system. It is, therefore, vulnerable to system weaknesses, especially with regard to service delivery, programme management and accountability. The sectorwide approach had resulted in a lowering of the profile of tuberculosis control. This was partially addressed by establishing a Line Directorate for TB/Leprosy under HNPSP. The stewardship and leadership role of the NTP had been weakened by the prolonged absence of a programme manager; this was resolved only recently.

Technical programme management (including financial management) capacity at the central level of the NTP remains sub-optimal. The recent focus on training, improvement of monitoring through quarterly meetings and the establishment of joint supervision have partially addressed these issues.

Planning is strictly centralized, which limits the initiation of innovative technical and management approaches. NGO partners, therefore, often take the lead in these initiatives, particularly at the operational level. Quality improvement of the programme, including staff management and

performance and service delivery, is not adequately addressed due to inherent weaknesses in supervision, monitoring and evaluation. Insufficient attention is being paid to identifying and fulfilling the skills-mix required at various levels through systematic HRD planning. Posts in the health cadre of the Bangladesh Civil Service are not filled in a timely manner due to the current recruitment policy and complex recruitment procedures. Recent recruitments have only partially addressed the issue of vacancies among medical officers and more particularly health assistants. The absence of opportunities for career development continues to result in loss of trained staff from the programme.

At the divisional and district levels, the centralized nature of planning and fund disbursements, and lack of communication on longer-term plans have led to a low level of involvement of district or *upazila* authorities in planning. This has contributed to insufficient ownership and inadequate understanding of the importance of the oversight role of civil surgeons and UH&FPOs. This has also resulted in ineffective monitoring and inadequacies in ensuring and building staff competencies, and the provisioning of necessary quality equipment and consumables by civil surgeons and UH&FPOs. Discrepancies in the process of planning and imbalances in the supervisory capacity between government staff and NGOs have resulted in constraints in joint planning and monitoring, and sub-optimal use of resources available at districts and *upazilas*, creating increased dependence on NGOs in matters of implementation and monitoring.

At the *upazila* level, existing vacancies and frequent transfers of government officials as well as the high turnover of NGO staff and staff of city corporations in particular disrupt the continuity of services. Weak infrastructure, absent or poorly maintained equipment at sadar hospitals and UHCs have led to dependence on NGO and private facilities. The latter leads to considerable out-of-pocket expenses on the part of the patient. Joint implementation of collaborative activities between implementing NGOs and the government is therefore sub-optimal, triggering likewise a dependence on NGOs for implementation.

Recommendations

The following are the recommendations related to health systems strengthening:

- Adequate attention should be given to ensure that an adequate number of skilled staff are deployed at all districts and *upazilas*, as well as to career advancement through a comprehensive national health HRD plan.
- Leadership, programme and, specifically, financial management training should be imparted to relevant staff at central, divisional, district and *upazila* levels.
- Junior consultants and medical officers (TB/leprosy or disease control) should engage with NGO staff in implementation and monitoring at district and *upazila* levels.
- Opportunities presented by different funding mechanisms such as GFATM should be utilized to address health systems constraints, including capital investment to strengthen infrastructure, communication, and transportation functions. These can benefit all three GFATM-supported disease control programmes.
- Skills on technical issues, programme management and quality improvement should be transferred through joint training of government and NGO staff at the operational level.
- An optimal balance should be realized in programme implementation through dialogue and joint government-NGO operational planning at the central and operational levels. This should take into consideration the comparative advantages of both sectors as well as leadership roles of civil surgeons and UH&FPOs.
- Job descriptions of staff of different cadre should be reviewed and training programmes should be redesigned on its basis.
- Many health system weaknesses may be best addressed jointly by two or more disease control programmes or across programmes.

11. Infection control

Observations

The need to diagnose and manage under programme conditions patients with drug-resistant forms of TB and those who may be co-infected with HIV necessitates the introduction of effective infection control measures in health facilities where these patients either present themselves for diagnosis or follow up or are admitted for in-patient care.

At the facilities visited, some administrative controls have been instituted. Patients once diagnosed with TB proceed directly for all follow-up examinations to DOTS corners or clinics established in the health facility. Smear-positive and smear-negative patients are admitted in separate wards wherever possible. However, the wards themselves are not separated in any way, with patients, staff and patients' relatives freely moving about. In terms of environmental concerns, all out-patient and in-patient facilities are well ventilated and open. Exhaust fans have been fitted in the hospital wards and laboratories in the Damien Foundation facilities. Standard laboratory infection control procedures were in place in most facilities visited. Hoods are available for smearing of slides at NTRL and biosafety level-2 cabinets are available in the laboratories where mycobacterial cultures are undertaken. Ultraviolet lights have been installed in the laboratories at Shyamoli CDC and in the Damien Foundation laboratories. Surgical masks are provided to smear-positive patients both in the out-patient and in-patient facilities. No other personal protection measures were available in any of the facilities visited. Waste disposal of infectious materials from the laboratories and in-patient facilities was not found to be satisfactory. Incomplete burning of waste material in open disposal pits or spaces was observed.

There is an acute shortage of hospital beds for the strict isolation of patients with MDR-TB. The MDR-TB ward in NIDCH has no additional measures in place. The wards themselves were also not isolated, with patients, staff and patients' relatives freely moving around. There were no demarcated changing areas for the staff except in NTRL. The single operation theatre at NIDCH where surgery is performed on MDR-TB patients is not equipped with the necessary environmental measures and theatre staff do not adopt any personal protection measures barring the standard surgical mask. The plans for new in-patient facilities, including the operation theatre in the buildings under construction, do not include any specific environmental or personal protection measures.

Recommendations

The review team made the following recommendations:

- The administrative measures to segregate infectious patients and those with drug-resistant forms of TB from general patients in the OPD areas should be strengthened and different spaces or

timings for concurrent DOTS and voluntary counselling and testing centres should be allocated.

- Appropriate feasible and cost-effective environmental measures should be introduced for infection control in the laboratories, in-patient wards and operation theatres.
- Necessary personal protection material should be secured for health personnel interacting with patients, particularly MDR-TB patients.

12. Human resources development for TB control

Observations

Having achieved 100% population coverage, the NTP enters a new, more complex phase with regard to HRD. An enormous amount of training activities has taken place to enable DOTS expansion. Additional staff are provided by NGOs to support the general health system and facilitate programme implementation.

The system and structure for HRD within the NTP is in place including a separate unit for HRD. HRD is also well reflected in the Strategic Plan for TB Control. Work has begun on a National TB Strategic Plan for HRD. There are, however, persisting weaknesses in the comprehensive long-term management of HRD activities. If not urgently addressed, these could seriously undermine the gains made.

Previous programme reviews in 2001 and 2004 only assessed the training aspects of TB-related HRD while other HRD-related aspects were assessed in HRD-specific monitoring missions. In addition to the challenges of training the TB workforce to ensure competence, NTP and partner NGOs must also address staffing, supervision, and support issues for comprehensive TB control. This includes:

- ensuring there is enough staff available;
- ensuring existing staff in the government-led health system, health service providers and health management and support workers are competent in relation to their job descriptions to implement the Stop TB strategy;

- ensuring staff are properly supervised and guided in delivery of TB services; and,
- ensuring that the necessary support systems are in place to enable the staff to perform their tasks.

This type of support is fairly available for NGO staff, though.

Many essential government posts were vacant in the UHCs and CDCs visited. Shortages and frequent transfers of government staff disrupt continuity of TB control services. Additionally, government staff reported fewer opportunities for job training and longer time since their last training in comparison with NGO staff in the same facility. Equipment (e.g. X-ray machines, centrifuges) in UHCs and CDCs was often found to be non-functional.

With regard to training opportunities, NGO staff were offered additional courses that were often not planned by NTP.

Additionally, there seems to be an incongruency that the reviewers could not reconcile in regard to training that is being provided for and by government staff. The NTP reported thousands of persons having received TB training each year (42 113 persons in 2006). However, many government staff delivering essential TB programme services and care reported not having been trained for several years. In reviews of reports and discussions with NTP HRD staff, one of the most frequently conducted courses was found to be a one-day field-level course on DOTS in which 20 129 participants enrolled in 2006. There were a total of 17 494 participants to the course in February and March 2007. According to the NTP training schedule, this course has been offered in 2006 or 2007 in the UHCs visited during the review but the staff interviewed did not remember having attended it. The primary target audience is government UHC staff, with allowance for some NGO staff. This course has a standard curriculum with learning objectives. Instructions are to be provided by the civil surgeon and the CDC junior consultant. The NTP provides funding for these courses, with attendance being assessed through signed vouchers of attendees. However, the NTP receives no information on how the courses are actually conducted, whether the learning objectives are met, or whether the actual attendees are government or NGO staff. The reviewers could not determine if government staff actually did not attend this course or attended it with the perception that this was a standard training course.

Quality assurance by NTP HRD staff is needed to ensure that government staff are attending these courses, that such courses are being conducted as intended, and that there is objective evaluation of these in such a way that their effectiveness can be ascertained.

Several other sections of this report identify job categories and programme areas with specific HRD needs. As the NTP progresses in the implementation of the Stop TB strategy, both Government and NGO staff will need capacity building in new areas such as culture for diagnosis, and identification and treatment of patients with HIV co-infection or MDR-TB.

Recommendations

The HRD-related recommendations include the following:

- A comprehensive national strategic plan for HRD should be finalized and annual implementation plans to address all areas and levels of TB control should be prepared. These plans should include career advancement of government staff, and appropriate education of physicians, nurses and other allied health professionals in basic training on the Stop TB Strategy and the NTP Guidelines.
- The NTP senior management and HRD unit should take a stronger and more proactive role in HRD for TB control in Bangladesh.
- The NTP should work with DGHS to fill essential TB programme posts with trained government staff, such that the NTP is less dependent on NGOs for the provision of essential TB programme activities and services.
- Additional staffing needs (number and category) should be identified at all levels to provide expanded, high-quality TB programme activities and services (e.g. culture services, MDR-TB treatment) in CDCs and at the UHC level. Population size and disease prevalence should be taken into consideration for staffing.
- Training needs should be assessed down to the district, *upazila* and peripheral level; mechanisms for evaluation of training (skills as well as knowledge) should be developed.

- Additional distance-based training materials should be developed (e.g. self-study modules) that can be provided to staff when hired, as well as for regular refresher updates or engaging private practitioners.
- A systematic process for developing training programmes and materials should be utilized, ensuring appropriate training/learning methodology and targeting relevant government and NGO staff.
- Untrained medical officers who are transferred to a CDC or UHC should be provided with the relevant training modules tailored for self-study at the time of joining in their new position while awaiting inclusion in the next regular six-day course based on these modules.
- In addition to government medical officers, modular NTP training should be provided to other staff to ensure correct categorization and compliance with NTP guidelines, including diagnostic algorithm.
- The NTP should ensure that TB training is continuous and ongoing; being once trained does not ensure continuing competence.
- In addition to training, tools to equip supervisors with the methodology to follow up staff after training should be developed.
- Medical officers posted in CDCs should be trained in management development, team building, and leadership; incentives should be provided for their active involvement and guidance in delivery of TB services by other providers.
- Government TB staff should be fully supported, with acceptable, safe working conditions and fully functioning equipment.

13. Migration and TB control

Observations

The movement of people within the country and abroad has significant consequences for TB control. Official estimates indicate that every year

250 000 people leave Bangladesh for employment overseas through official channels. Labour migration continues to provide livelihood options for many in Bangladesh. Other reasons for migration within the country include academic pursuit, occupational (e.g. truck-drivers) reasons, displacement due to riverbank erosion and floods and the dismantling of slums. In most cases, movement is viewed as a part of life by most people. The extent of human trafficking is not exactly known. In order to better manage the huge flows of people, particularly for overseas employment, the government is moving towards a broad management perspective on migration. The International Organization for Migration is providing technical support through the Ministry of Expatriates' Welfare and Employment.

The perceptible consequences of migration on TB control include irregular or incomplete treatment that could lead to unfavourable outcomes and emergence of drug resistance.

Most patients under treatment try to contact the DOT provider before moving out of or after settling down in a particular place. Providers also help by supplying limited amounts of drugs to bridge the gap. Although a transfer system has been designed, it is not always possible to follow this option.

Recommendations

The following were the recommendations made:

- Patients moving permanently to another place should be transferred and their transfer communicated using the designed transfer form and/or by telephone. The receiving centre should provide feedback to the referring centre on a routine basis.
- Health workers should ensure continuation of TB treatment for people going abroad.
- Health workers should give due emphasis on correctly transferring patients belonging to mobile population groups.
- New partnership for addressing TB in mobile populations should be considered involving NTP, relevant NGOs, the Ministry of Expatriates' Welfare and Employment, City Corporation authorities, etc.

14. Advocacy, communication and social mobilization

Observations

ACSM is an essential component of the NTP designed to increase awareness about TB; build knowledge and understanding of signs and symptoms; promote early health-seeking, screening and treatment options; and ensure treatment adherence. ACSM can also address barriers of TB stigma and discrimination which may impact treatment efficacy. The ACSM programme in Bangladesh is well established, largely due to the considerable support provided by a number of key NGOs in the form of training, community-based advocacy and events, development and dissemination of programme communication materials, and national and district media programming. Many of the features of a comprehensive ACSM programme are currently in place. Technical assistance has been secured to optimize programme delivery. The time is now right for the NTP to take the lead and move forward towards a more strategic, integrated, multi-level programme in order to achieve significant behavioural impact.

A major objective of the NTP Strategic Plan for TB Control is to establish a long-term, multi-level, integrated ACSM strategy to build ACSM capacity, mobilize support and achieve measurable and sustainable behavioural change.

Challenges include the geographic demarcation of NGO activities leading to diffracted ACSM approaches and sub-optimal support in areas where the partner NGO is less specialized in ACSM. There is also no strong culture of ACSM strategic planning or intensive, coordinated, multi-level programming. The different funding cycles as well as funding delays make strategic planning for an integrated programme difficult. Some NGOs may not yet have the capacity for developing ACSM activities or appear not fully committed for building government capacity for ACSM. The lack of coordination with the Government Health Education Bureau also demonstrates the limited commitment of the government towards ACSM.

Synergies can be built through collaboration with partners to create intensive, multi-level programming for measurable behavioural impact. Best

practices in community DOT provision and scale-up for optimum programme delivery can be documented. There is also an opportunity to develop a monitoring and evaluation framework to measure Knowledge-Attitude-Practice-Behaviour indicators for programme impact.

Recommendations

The review recommendations for the ACSM components were as follows:

- Coordination and integration should be strengthened through an ACSM Steering Committee comprising the NTP, the Health Education Bureau of DGHS and key partners.
- A phased, staged, strategic ACSM planning process should be institutionalized.
- Capacity should be built by enhancing NTP/NGO counterpart relationships and through ongoing technical assistance.
- The use of community and public advocacy should be optimized through *shasthya shebikas*, village doctors, cured patients, pharmacists, other health workers and volunteers.
- A research-based model for message development should be developed. It should include formative research and message pre-testing as well as briefing documents for strategic and creative development and communication of messages.
- Integrated Information-Education-Communication material to support advocacy efforts should be provided for TB and other priority health areas which are to be used by *shasthya shebikas*, village doctors and other health advocates.
- A national Communication Resource Information System and an accompanying TB/HIV/Lung Health Resource Centre may be established.
- The monitoring and evaluation framework should include ACSM key performance indicators. It should incorporate formative research, and qualitative and quantitative methods to measure programme impact, and also provide ongoing programme intelligence.

15. Operational research

Observations

The NTP has accorded high priority for operational research. The MBDC directorate in 2007 established two research committees for TB: one technical and one implementing and monitoring committee each with terms of references approved by the DGHS and consisting of specialists from MBDC and the NTP (including its 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.

The MBDC identified eight priority areas and called for proposals. These priorities included:

- Knowledge and perception of residents of community/slum/peri-urban areas about TB transmission and treatment and its control activities; and a situation analysis of tuberculosis in peri-urban areas.
- Delay in health-seeking behaviour, diagnosis and treatment for TB and its associated factors.
- Reasons of default or drop-out among registered cases.
- Factors contributing to inadequate referral in urban areas related to the formal and non-formal private sector.
- Assessment of DOTS and DOTS-Plus implementation quality.
- TB prevalence or burden among HIV/AIDS patients.
- Sputum conversion with age, sex and nutritional status.
- Effectiveness of training on sputum microscopy.

The MBDC has committed itself to fund these operational research projects from HNPSP funding sources.

It is encouraging that during the past decade NGOs and research institutions – including BRAC, Damien Foundation, ICDDR'B, the Nuffield Institute of International Health of the University of Leeds (UK), the Research Institute for Tuberculosis, Japan and University Research Co. LLC

(URC) – have in collaboration with NTP addressed many research questions related to tuberculosis (Annex 6).

The reviewers were apprised of the various research activities. The team was informed about the status of the prevalence survey by ICDDR'B. These sessions allowed to review the current TB-related operational research activities and to identify the future priorities.

In addition, the review team identified the following research areas:

- Countrywide TB prevalence survey (actual start planned in November 2007).
- Countrywide cross-sectional surveys on HIV prevalence among TB patients every two to three years.
- Prevalence of childhood TB.
- Incidence of adverse effects of anti-TB drugs.
- Modalities for public-private or public-public mix for DOTS in the workplace.
- Countrywide MDR-TB prevalence surveys.
- Effectiveness of different treatment regimens.
- Baseline TB mortality study.
- Formative research to identify key issues for setting ACSM objectives.
- Communication pre-testing research.
- Pre- and post-intervention quantitative research to measure the impact of ACSM activities.

Recommendations

The review team made the following recommendation:

- Findings of research should be documented on time and disseminated to policy-makers, potential donors and health planners to develop new approaches towards more effective TB control.

16. Drug-resistant tuberculosis

Extent of the MDR-TB problem

Limited data are available on the extent of anti-TB drug resistance in Bangladesh. Several drug-resistance surveys among small numbers of new and previously treated TB patients have been undertaken mainly by ICDDR'B and the Damien Foundation since 1998. While these studies were not representative of the country as a whole due to the sampling methodology, they have revealed a steady decline in the levels of MDR-TB among new TB patients between the first studies conducted in 1998 and the most recent studies conducted during 2004-2005 (Table 3).

Table 3: *Prevalence of MDR-TB in Bangladesh*

Study		% MDR-TB among	
		New cases	Previously treated
Rabiul Hossain et al.	BSMMU 1998	4.9%	
A. Van Deun et al.	DF 1995 (n=645)	0.7%	6.8%
	DF 2001 (n=1041)	0.4%	3.0%
K. Zaman et al.	ICDDR'B 2001-03 (n=657)	3.3%	27.3%
	ICDDR'B 2004-05 (n=106)	3.0%	15.4%

Culture and DST has also been done in NTRL. Cultures are most commonly done among those cases who fail to be cured with the Category-2 regimen.

Diagnosis of MDR-TB

The strategies for identifying MDR-TB cases are two-fold. Damien Foundation routinely examines Category-1 and Category-2 failures, relapses, returns after default, as well as failures and relapses after Category-3.

The NIDCH has adopted the policy of examining only Category-2 patients who remain sputum-positive at five months.

Culture and DST facilities for the diagnosis of MDR-TB are available at NTRL. However, this recently established laboratory is still in the process of being certified as quality assured for culture and DST. It currently has a very high contamination rate. The Damien Foundation laboratory performing culture and DST is linked to the Antwerp SRL. This SRL also undertakes DST of second-line drugs for the Damien Foundation. The ICDDR'B laboratory is another facility having the capacity for culture and DST and working in collaboration with NTP. It is, however, not linked to the global SRL network.

The NTP has planned to establish regional TB reference laboratories at Rajshahi, Chittagong and Khulna. Feasibility assessment studies in these divisions have already been completed. The laboratory at the Rajshahi Chest Disease Hospital is expected to commence conventional culture as well as slide culture with DST by the end of 2007 with support from the Damien Foundation and provide services to the entire Rajshahi division. BRAC is committed to support the setting up of the laboratories in Khulna and Chittagong.

Treatment of MDR-TB

At NIDCH, a 24-month regimen comprising six months of kanamycin (K) or amikacin (A), ethionamide (Eth), ofloxaxine (O) or ciprofloxacin (C), ethambutol (E), and pyrazinamide (Z), followed by 18 months of Eth, O/C, E and Z is in place. A total of 165 patients have been treated since 2002. The current treatment regimen is being administered to 88 patients. Patients are hospitalized for the entire two-year period; only 16 patients have so far been allowed ambulatory care. Treatment follow-up is based on sputum culture and DST performed every quarter. Cure rates of 80% or more have been achieved.

The Damien Foundation has used eight regimens with treatment durations varying between 9 and 21 months over the past 10 years, including two gatifloxacin (G)-based regimens. A total of 438 patients were enrolled under the various treatment schemes. Cure rates varied between 57% and, for the more recent regimens, 93%. The failure rates were less than 5%, except for one regimen. The Damien Foundation follows the policy of placing all Category-2 failures on second-line regimens. Patients are hospitalized only for the intensive phase or less, after which treatment is

provided on ambulatory basis. All cured MDR-TB patients are actively followed up for two years after cure in order to determine the relapse rates. Preliminary data indicate that relapses are rare (Table 4).

Table 4: *MDR-TB Treatment regimens and outcomes, Damien Foundation*

Regimen	Total	Cured	Died	Default	Failure	On treatment	Relapse
3KOPthHClofEZ/12OEHZPth/6EPth	59	68%	15%	12%	5%	0%	2%
3KOPthHClofEZ/12OEHZPth	14	79%	0%	14%	9%	0%	0%
3(+)KOPthClofEZ/12OEZPth	34	56%	15%	21%	7%	0%	0%
3(+)KOPthClofEZ/12OEHZ	46	65%	9%	9%	17%	0%	0%
3(+)KOPthClofEZ/12OEHZClof	38	84%	5%	8%	3%	0%	0%
3(+)KOPthClofEZ/12OEHZPth	31	77%	3%	19%	0%	0%	0%
4(+)KPthHCGZE/5CGZE	53	92.5%	2%	6%	0%	0%	0%
4(+)KPthHCGZE/5CGZE (high dose of G)	91	33%	4%	4%	0%	63%	0%

Data from the Damien Foundation are also indicative of an amplification of rifampicin resistance as a result of the use of the Category-2 regimen among failures of the current Category-1 regimen, compared to the previous Category-1 regimen (Figure 4). This is indicated by a worrying upward trend in MDR-TB among previously treated cases following the introduction of the thrice-weekly rifampicin containing continuation phase of the Category-1 treatment regimen (Figure 5).

Recommendations

These are the main recommendations related to drug-resistant TB:

- Further development of MDR-TB should be prevented by sensitizing private practitioners and specialists on issues related to development of drug resistance.

- Ambulatory care for MDR-TB should be carefully piloted to ensure optimal case holding.
- Second-line drugs should be procured through GDF using GFATM support.
- Outcomes from treatment regimens should be reviewed for continued use and scale-up of these regimens in consultation with GLC.
- Laboratory capacity should be built to support MDR-TB management and undertaken the planned national drug-resistance survey.
- National drug-resistance surveys should be conducted every three to five years to determine trends in drug resistance.
- Culture for all Category-1 failures should be considered after adequate capacity for culture has been established.

Figure 4: ***Drug resistance by retreatment group Damien Foundation, 1995-2006***

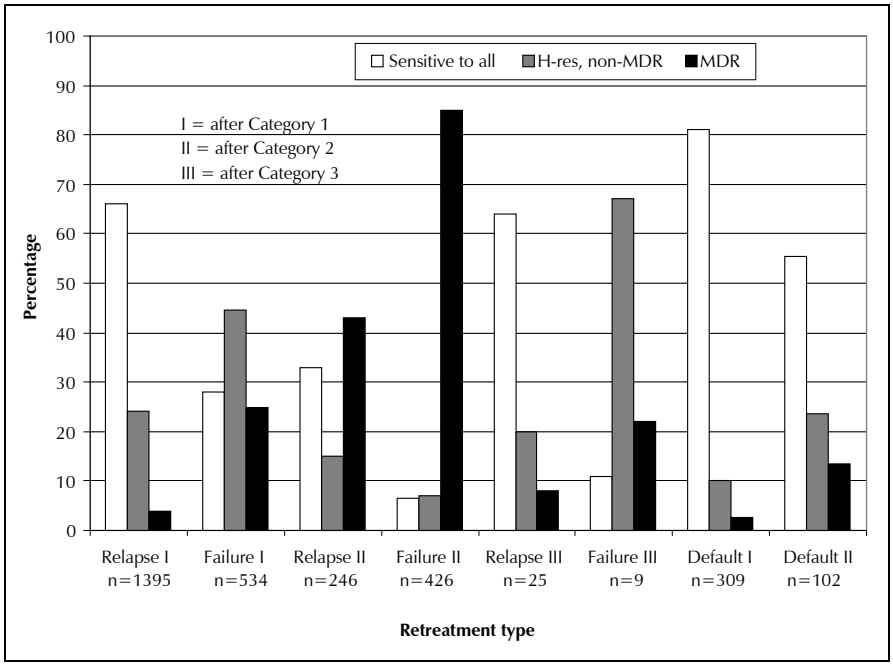
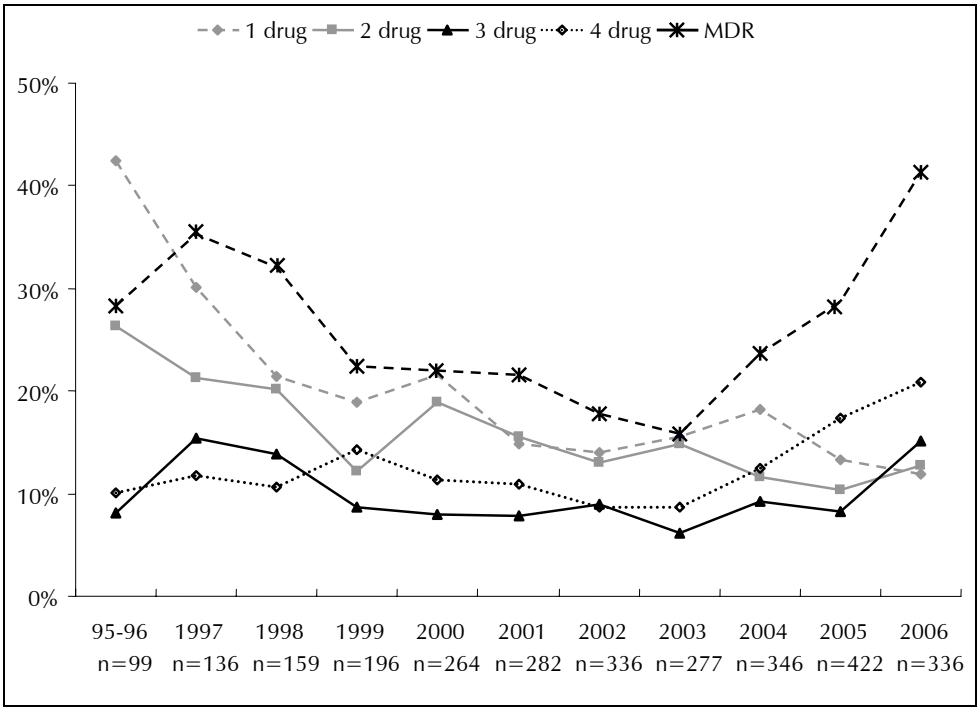


Figure 5: ***Trends in drug resistance among previously treated cases Damien Foundation, 1995-2006***



17. TB/HIV

Observations

The extent of TB/HIV co-infection is not exactly known in Bangladesh. There is a clear need to keep the trend of TB/HIV co-infection under surveillance. According to three studies carried out in Dhaka city between 1999 and 2007, the figures for HIV prevalence among TB patients have been consistently low. The surveys were conducted between January and June 1999 (first round), between August 2001 and June 2002 (second round), and between August 2006 and July 2007 (third round). The first survey was conducted in two outdoor clinics in Dhaka. The second and third surveys were conducted in the same two outdoor clinics and among indoor patients of NICDH.

In the first survey, one out of 936 new sputum smear-positive patients was found HIV positive. In the second round, no HIV-positive patients were found from among 959 outdoor patients while one out of 887 patients in NICDH was found positive. In the last round, one from among 1002 outdoor patients and four of 879 indoor patients were found positive. According to government estimates there were nearly 7500 people infected with HIV in the country as of December 2004. The UNAIDS/WHO 2006 estimates indicated the number of HIV-positive adults and children in Bangladesh to be 11 000. The HIV prevalence in the adult population (15-19 years) is estimated to be less than 0.1%. However, a rising trend is seen in HIV prevalence among injecting drug users (IDUs). Since 2006 HIV has turned into a concentrated epidemic with prevalence among IDUs reaching 7%. A study conducted by ICDDR'B in 2007 showed 0.1% HIV co-infection in ambulatory patients and 0.4% in hospital-admitted patients in Dhaka city.

The Strategic Plan for TB Control has identified TB/HIV collaboration as one of the major service delivery areas. The plan envisages four key activities, namely: developing a national policy for TB/HIV; establishing functional linkages between NTP and NASP; increasing awareness among HIV workers for identification and referral of TB suspects, and carrying out HIV sero-prevalence studies among TB patients. It also describes process indicators to address TB/HIV issues as well as targets for each indicator for the year 2007 and 2010. The DGHS has formed a "Forum for HIV and TB Collaboration" with members from NASP, NTP and WHO. The forum is, however, yet to organize meetings.

A number of NGOs are currently working along with NASP to deliver HIV/AIDS awareness activities at the district level. Voluntary counselling and testing facilities are available at major cities as well as at the divisional level. However, anti-retroviral services are still limited to metropolitan cities. Some NGOs working for TB control programmes are providing orientation training to staff of NGOs working for HIV prevention and care.

Recommendations

The following recommendations were made with regard to TB/HIV:

- The Forum for HIV and TB Collaboration should convene regularly (at least once every quarter). This forum should set policy guidelines, define roles and responsibilities of different

partners, and prepare a plan of action with a timeframe and process indicators.

- A national guideline for functional linkages between TB and HIV services should be developed. This may include operational issues such as joint training, cross-referral, joint-reporting, treatment issues of co-infected patients, etc..
- Experiences from ongoing initiatives should be documented, reviewed and strengthened in line with the national guidelines. Different experiences in terms of types and designs of collaboration mechanisms, successes and failure along with their reasons and actions taken for correction or modification of activities should be critically reviewed before scaling up and replication.
- A National HIV prevalence survey among TB patients should be carried out every three years.

18. Funding for TB control

Background

Under the Bangladesh IPRSP (2003), TB is maintained as one of the main causes of avoidable deaths in the country. Strengthening access to the Essential Service Package under the sectorwide approach (SWAp) with special focus on the health needs of the poorest and most vulnerable, both in rural and urban areas, is of highest priority. The government's SWAp for Health is a part of HNPSP. Under this programme, TB has been prioritized because of its severity and high prevalence and also because the disease exacerbates poverty. TB takes its highest toll during the most productive years of life.

The HNPSP has an 'Operational Plan' for the period 2003-2010. Allocations are decided by the Planning Commission based on this plan. Tuberculosis (and leprosy) control is part of the workplans with budgets received from the district and divisional level. The planning cell in DGHS proposes the budget to the Planning Commission in the Ministry of Finance. After approval by the Planning Commission, the disease control divisions in DGHS are informed about their field allocations. The country has a clear planning cycle. Developmental partners are involved in the planning and review stages (Annual Programme Review) of the budgeting process.

There is a clear vision for TB control in Bangladesh and the Strategic Plan for TB control (2006-2010) details the policy for control of the disease in the country.

The Global Fund is the largest contributor to the NTP. The quantum of Its contribution is increasing over the years. Under GFATM (Round 3) funding, the NGOs are the major sub-recipients and receive 60% of the funding under Principal Recipient BRAC. Under GFATM Round 5 funding, approximately 60% of the grant is being channelled through the Government Principal Recipient (Economics Relations Division (ERD) under Ministry of Finance) (Table 5). A large number of NGOs are involved in partnerships with the NTP and contribute a substantial amount of additional funding.

Table 5: *GFATM funding support to Bangladesh*

Round	Approved grant / Total lifetime budget (US$)	Principal recipient	Programme start date	Grant amount (US$)			Amount disbursed (US$)		
				Phase I	Phase II	Total	Phase I	Phase II	Total
3	**42 466 601**/ 42 466 601	BRAC	01-Aug-04	11 172 846	15 847 311	**27 020 157**	11 172 846	6 747 744	**17 920 590**
		ERD	01-Sep-04	5 470 228	9 976 216	**15 446 444**	5 470 228	2 252 306	**7 722 534**
5	**9 664 425**/ 45 637 671	BRAC	01-May-06	3 864 851		**3 864 851**	3 050 610		**3 050 610**
		ERD	01-May-06	5 799 574		**5 799 574**	1 457 840		**1 457 840**

Source: www.theglobalfund.org, accessed on 19 October 2007

The CCM is active and various stakeholders in TB control are represented on the CCM. However, there were major delays in GFATM fund flows due to excessive interministerial procedural delays.

Resource allocation by the Government of Bangladesh

The total outlay of the country's budget for the financial year 2007-2008 is Taka 796 billion (US$ 11.6 billion), of which Taka 55 billion (US$ 803 million) is allocated for health (6.9%). For the financial year 2007-2008, a total amount of Taka 32 billion (US$ 467 million) is allocated for the health, nutrition and population sector. Of this, Taka 722 million (US$ 10.5 million) is earmarked for TB and leprosy.

The budgeting process takes into consideration the availability of aid from donor countries. Project aid constitutes one third of all available resources in the HNPSP budget (Tables 6 and 7).

Table 6: *Government funds and project aid for the fiscal year 2007-2008 (in million Taka)*

	Approved 2003-2006	**Revised 2003-2010**	**Percentage of development budget**	**Percentage of overall budget**
Government	14 000	54 297	33.5%	
Project aid	32 000	107 935	66.5%	
Sub-total (Development budget)	*46 000*	*162 232*		*50%*
Government (Revenue budget)	48 100	162 271		50%
Total budget	**94 100**	**324 503**		
Project aid as proportion of total government budget				33.3%

Source: Executive summary, HNPSP, Revised Programme Implementation Plan, November 2005, MoH&FW, Government of People's Republic of Bangladesh

Table 7: *Allocation to the MBDC directorate for the fiscal year 2007-2008, as per the Operational Plan 2003-2010 for TB and Leprosy Control, Government of Bangladesh (in million Taka)*

Financing pattern	**Proposed allocation**
Government	41.2
Loan (government)	74.4
Other than loan	261.2
Sub-total	*376.7*
NGO component (GFATM)	342.6
Grand total (Government and NGOs)	**719.3**

Source: HNPSP Operational Plan (revised, July 2003-June 2010)

The Global Fund is a major donor to NTP. The programme made its first successful application in the third round of funding for increasing DOTS coverage. Thereafter the programme has made one more application (under Round 5). In 2006, GFATM grants comprised more than 68% of the

expenditure of NTP. The budgets show an increasing GFATM contribution over the years. The government component is adjusted to cater to fluctuations in the availability of other donor funds (Table 8).

Table 8: *Contribution of the government and GFATM in yearly TB budget*

Funding source	2006	2007	2008
Government	19.8%	15.1%	17.1%
GFATM	68.1%	71.2%	74.7%
Other sources	7.9%	13.3%	8.2%

Source: NTP data submitted to WHO for Global Report 2008

The review team was informed that the budgeting gap analysis is conducted usually at the Annual Programme Review or prior to application for donor funding.

Strengthening of financial management within the NTP is underway. WHO is the main contractual partner under the ERD Principal Recipient for both GFATM Round 3 and Round 5 grants.

Preliminary analysis of unaudited financial expenses in 2006 indicates a shortfall in planned expenditure (Table 9). Figures from the previous year indicate a better utilization of planned resources. It was observed for 2006 that the programme had spent only 64% of all available funds. The capacity to absorb committed funds and report expenditure is an important indicator of administrative commitment to utilize resources for TB control.

Table 9: *Planned and actual expenditure by source of funds, 2006 (in million US$)*

Funding source	Expected funding for 2006 as per planned budget in 2005	Actual expenditure for 2006 as reported in 2007	Percentage expenditure
Government	3.95	2.72	68.9%
Loan	0.89	0.58	65.2%
GFATM	11.35	9.39	82.7%
Other grants	5.35	1.09	20.4%
Total	**21.54**	**13.78**	**64.0%**

Source: NTP Annual Report to WHO, 2007

Recommendations

The review team made the following recommendations:

- Sustained donor support to TB control activities in Bangladesh is essential over the next few years to be on track for achieving the Millennium Development Goals. The NTP may consider seeking more donor support for various identified activities.
- Capacity building of the Finance Management Unit within the NTP should be undertaken in order to bolster planning and ensure timely reporting as per donor requirements. Book-keeping and accounting may be followed in a uniform manner.
- Financial reporting requirements of various donors must be met. Fund flows are to be streamlined and processes for mitigating procedural delays should be undertaken.

Annex 1

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Annex 2

Programme

Date	Visit
Tue 16 Oct 2007	Arrival of international reviewers
Wed 17 Oct 2007	Introduction of team members Courtesy visit to the Secretary, MoH&FW Briefing of WHO Representative Briefing by the programme
Thu 18 Oct 2007	Briefing by NGO partners (BRAC, Damien Foundation, ICDDR'B, Leprosy-Tuberculosis Coordinating Committee, NGO Service Delivery Project, Urban Primary Health Care Project, URC) Meeting with NTP and WHO staff Formation of teams
Fri 19 Oct-Wed 24 Oct 2007	**Field visits** **Team I** Dhaka division; **Team II** Chittagong and Sylhet divisions; **Team III** Rajshahi division; **Team IV** Barisal division and Greater Faridpur; **Team V** Khulna division
Thu 25 Oct 2007	Feedback from field Technical discussion
Fri 26 Oct 2007	Technical discussion
Sat 27 Oct 2007	Technical discussion Finalization of executive summary Farewell dinner
Sun 28 Oct 2007	Debriefing with WHO Representative Debriefing with Hon. Adviser Departure of international reviewers

Annex 3

Places visited and people met

TEAM I: DHAKA DIVISION

Shyamoli CDC

Dr Muksud Ahmed, Junior Consultant

Dr Jahanara Begum, Junior Consultant

Dr Habibur Rahman, Medical Officer

Ms Farhana, Programme Organizer, NATAB

Ms Parveen, Med. Tech. (Lab.)

NTP Central Store, Shyamoli

Mr Liaquat Ali, Storekeeper, NTP Central Store

Shyamoli DOT centre

Ms Badrun Naha, Senior Staff Nurse

Ms Gulshan Ara, Pharmacist

UPHCP-II, PSKP-Pa, Mirpur, Dhaka

Mr Jamal Abdul Naser Chowdhury,
Project Director, UPHCP-2

Mr Waliul Islam, Staff Consultant,
Urban Health, Asian Development Bank

Dr Lutfar Rahman, TB consultant, UPHCP

Dr Kazi Nurun Nabi, Project Manager

Md Alauddin, Project Administrator

Mr Golam Kibria, Project Administrator (Savar)

Dr Shamima Afroj, Clinic Manager, CRHCC

Dr Rehma Sarwat Salam,
Monitoring & Evaluation Officer

Mr AKM Fazlur Rahman, Counselor HIV/AIDS

Md Abu Bakar Siddique,
Laboratory Coordinator (EQA)

Mr A. Mannan, Team Leader, HAZIR group

NSDP, CWFD centre, Tejgaon, Dhaka

Ms Shamima Sultana, Clinic Manager

M.A. Jalil, Supervisor

Ms Mahamuda Parveen, Paramedic

Ms Protiva Chisik, Paramedic

Ms Cicilia Palma, Paramedic

Ms Sayda Begum, Service Promoter

Ms Nargis Fatema, Service Promoter

Ms Badrun Nahar, Lab. Technologist

Ms Zobaida Khatun, Lab. Technician

Md Al Mamun Mollah, Field Supervisor (TB)

Md Khalilur Rahman, Messenger

Ms Sheuly, Ayah

Dr Refat Rabbi, CWFD Monitoring Officer

Dr Nadim Mahmud, NSDP TB Coordinator

Jalchatra Hospital, Madhupur, Tangail

Dr Aung Kya Jai Maug,
Assistant Medical Adviser

Mr Khondoker Habebul Arif, Project Director

Dr Mihir Ranjan Sarkar, Hospital Director

Dr Quazi Al Mamum Siddiqui, Medical Officer

Dr Goutam Kumar Biswas, Medical Officer

Ms Nalini Chambugong,
Sr Laboratory Technician

Md Rafiqul Islam, Laboratory Technician

Ms Nirala Khatun, Asstt. Laboratory Technician

Mr Babul Sangma, Pharmacy Assistant

Ms Ashis Kumar Sarker Head Nurse

Upazila Health Complex, Kalihati, Tangail

Dr Md. Abdul Kader, UH&FPO

Dr Golam Mostafa, Consultant, Surgery

Dr Shombhunath Chakraborty, RMO

Md Haider Ali Miah, Med. Tech. (Lab.)

Md Nurul Islam, PO, CS Office

Md Ameer Ali, Field Coordinator, DF

Mr Debatosh Roy, TLCO, DF

Mr Kartic Banik, TLCA, DF

Md Khorshed Alam, TLCA, DF

Ms Jhuma Das, Clinic Assistant, DF

Upazila Health Complex, Mirzapur, Tangail

Dr Abu Elias Prodhan, UH&FPO

Md Abul Kashem, LTCA

Md Asaduzzaman, Storekeeper

Dr Goutam Biswas, Medical Officer, DF

Mr Francis Hajong, TLCO, DF

Md Kamrul Islam, TLCA, DF

Ms Jesmin Sultana Mukta, Clinic Assistant, DF

Montosh Chandra Das, TLCA

Civil Surgeon Office, Tangail

Dr SM Abu Taher, Civil Surgeon

Dr Abdur Razzak, Deputy Civil Surgeon, Tangail

Md Nurul Islam, Programme Organizer

Dhaka Medical College, Dhaka

Prof. Dr MA Faiz, Dept of Med., Principal

Prof. Dr MA Kashem Khondaker, Dept of Med.

Prof. Dr FM Siddiqui, Dept of Med.

Prof. Dr HAM Nazmul Ahsan, Dept of Med.

Prof. Dr Omar Ali, Dept of Surgery

Prof. Dr Kohinoor Begum,
Dept of Obs. and Gyn.

Prof. Dr Abdul Jabbar Miah,
Dept of Community Medicine

Prof. Dr Abid Hossain Mollah,
Dept of Paediatrics

Brig. Gen. Dr Shahid Khan,
Director, Dhaka Medical College Hospital

Associate Prof. Dr Syed Md Arif,
Dept of Medicine

Associate Prof. Dr Billal Hossain,
Dept of Medicine

Associate Prof. Dr Md. Kibria,
Dept of Nephrology

Associate Prof. Dr LE Fatmi, Dept of Paediatrics

Associate Prof. Dr Syeda Anwar,
Dept of Paediatrics

Associate Prof. Dr Narayan Chandra Saha,
Dept of Paediatrics

Dr Kazi Enamul Kabir, Deputy Director,
Dhaka Medical College Hospital

Asst Prof. Dr Mirza Azizul Hoque, Dept of Endocrinology

Asst Prof. Dr Ahmed Murtaza Chowdhury
Dept of Paediatrics

Asst Prof Dr AKM Matiur Rahman,
Dept of Paediatrics

Dr Ahmedul Kabir, Resident Physician and focal point, DOTS corner, Dept of Medicine

Dr Monir Hossain, Resident Physician,
Dept of Paediatrics

Dr Rubaiya Parveen, Registrar,
Dept of Paediatrics

Dr Shaila Parveen, Medical Officer,
DOTS corner, BRAC

Ms Kazi Sayeda Parveen, PO, BRAC

Ms Shefali Baiddya, PO, BRAC

Ms Jashim Sarwar, RHC, BRAC

Ms Morsheda Khatun, PO, BRAC

Civil Surgeon Office, Narsingdi

Dr Birendra Nath Sinha, Civil Surgeon

Dr Najib Ahmed, MO(CS)

Momin Mollah, PO

Dr Khorshed Alam, Consultant,
Paediatrics, Sadar Hospital

Dr SK Sadiqur Rahman, RMO, Sadar Hospital

Dr Rahmatullah, Cardiologist, Sadar Hospital

Mr Tapan Kumar, SHC, BRAC

Md Shahidullah, RHC, BRAC

Ms Yuki Yoshimura, Chief Advisor,
Safe Motherhood Project, JICA

Mokbul Ahmed, District Coordinator,
Safe Motherhood Project, JICA

Upazila Health Complex, Narsingdi Sadar

Dr Mosharraf Hossain, UHFPO, Narsingdi Sadar

Dr Goura Pada Sarker, MO

Md Kamal Hossain, LTCA

Md Sarwar Hossain, *Upazila* Manager, BRAC

Ms Shakila, *Shasthya Shebika*, Bhela Nagar

Md Shamim, PO, BRAC

NIDC&H and National Tuberculosis Reference Laboratory, Mohakhali, Dhaka

Prof. Dr Md Mostafizur Rahman,
Dept of Respiratory Medicine and Director

Prof. Dr Jamshed Haider Siddique,
Head, Dept of Pathology and Microbiology

Prof. Dr Md Rashidul Hassan,
Dept of Respiratory Medicine, NAC

Prof. Dr Md Ali Hossain,
Dept of Respiratory Medicine

Asst Prof. Dr SM Mostafa Kamal,
Coordinator NTRL, Dept of Microbiology

Asst Prof. Dr Md Rafiqul Islam,
Resident Physician

Dr Kazi Yusuf Ali, Medical Superintendent

Dr Rumana Shams, Medical Officer

Dr Roef Kabir, Medical Officer

Dr Nazrul Islam, Medical Officer

Dr Sharifa Chowdhury, Medical Officer

Md Jahangir Alam, Store Officer

Ms Hashi Bairagi, Senior Staff Nurse,
In-charge DOTS centre

Ms Lutfun Nahar, Senior Staff Nurse

Ms Sultana Akhter, Senior Staff Nurse

Mohiuddin Ahmed, Med. Tech. (Lab.)

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

Sujan kumar Sarker, Med. Tech. (Lab.)

Mausumi Chowdhury, Med. Tech. (Lab.)

Shahidul Islam, Laboratory Attendant

Sukanto Baral, Laboratory Attendant

DEPZ Medical Centre, Savar

Dr Sharafuddin Md Ahia, Chief Medical Officer

Dr Shamima Ferdousi, Medical Officer

Matiar Rahman, TLCO,
DEPZ TB Coordinator, DF

Mahmuda Begum, Clinical Assistant, DF

Hop Lun Factory, DEPZ, Savar

Mr. Nirupam Barua, Asstt. General Manager

Dr Nahreen, Medical Officer

Dr Nisha, MPS, MO

TB Patient

Cured TB patient

TEAM II: CHITTAGONG AND SYLHET DIVISION

Sylhet

Dr Abdur Rob Chowdhury, Director (Health),
Sylhet Division

Brig. Gen. Dr Shah-e-Alam, Director,
MAG Osmani Medical College Hospital

Dr AZ Mahbub Ahmed, Civil Surgeon, Sylhet

Dr Md Monirul Islam, Sr Consultant,
Chest Disease Hospital, Sylhet

***Upazila* Health Complex, Bishwanathpur, Sylhet**

Dr Md Kaiyum Uddin, UH&FPO

Dr Mahmudul Hasan Rahat,
Medical Officer (Disease Control)

Mr Arjen Chandra Das, Med. Tech. (Lab.)

Mr Asit Kumar Das, TB Control Assistant, HEED

Mr Hira Miah, TB Control Assistant, HEED

***Upazila* Health Complex, Jantiapur, Sylhet**

Md Bashirul Islam, UH&FPO

Dr Jannatul Noor, Resident Medical Officer

Ms Nasiva Hossain, Med. Tech. (Lab.)

Mr Kamal Biswas, TB Control Assistant, HEED

Mr Dipak Mollick, TB Control Assistant, HEED

Ms Supriti Paul, TB Control Officer, HEED

Mr Nazrul Islam, TB Control Officer, HEED

Mr Pius Serao, Programme Manager, HEED

Office of the Civil Surgeon, Noakhali

Dr AKM Kamaluddin, Civil Surgeon

Dr AKM Jahangir Hossain, Superintendent,
250-bedded hospital

Md Habibul Kabir Choudhury,
Deputy Commissioner

Dr Md Rahmatulla Khan, Jr Consultant.
Noakhali CDC

Dr KM Hossain, President, NATAB, Noakhali

Mr Harun-ur Rashid,
Regional Health Coordinator, BRAC

***Upazila* Health Complex, Sonaimuri, Noakhali**

Dr Abu Kalam Siddique, UH&FPO

Dr Md Moynul Hossain,
Medical Officer (Disease Control)

Md Nazrul Karim, Med. Tech. (Lab.)

ASM Asaduzzaman,
Regional Health Coordinator, BRAC

***Upazila* Health Complex, Senbagh, Noakhali**

Dr Md Jahurul Haque, UH&FPO

Dr Syed Kamrul Hossain Medical Officer
(Disease Control)

Mr Kamal hossain, LTCA

Mr Liakat Ali, Programme Organizer, BRAC

Mr Khalilur Rahman, .Programme Organizer,
BRAC

Md Abu Nazib. Regional Health Coordinator,
BRAC

Chittagong

Dr Sayedur Rahman, Director (Health),
Chittagong Division

Brig. Gen. Dr. Abdur Rahman, Director,
Chittagong Medical College Hospital

Dr MA Jalil, Civil Surgeon, Chittagong

Dr Ahmad Hossain, Jr Consultant,
Chittagong CDC

Dr Sanjib Kumar Das, Divisional Consultant,
WHO

Dr Abdul Ahad Talukdar, Quality Specialist TB,
BRAC

Mr Kazi Nurun Nabi, Sr Health Coordinator,
BRAC

Mr Md Nizamul Islam,
Regional Health Coordinator, BRAC

Mr Sanjay Paul, Regional Health Coordinator,
BRAC

Chittagong Medical College Hospital

Dr Biswanath Dutta, Resident Physician

Ms Moitri Barua, Programme Organizer, BRAC

Ms Nirala Chakma, Programme Organizer,
BRAC

Mr Nizamul Islam, Regional Health
Coordinator, BRAC

**Youngone Group (Bangladesh) Ltd.,
Chittagong EPZ**

Dr Shyamal Kanti Barua,
Chief Medical Officer (TB)

Ms Lekheka Chakma, Laboratory Technician

Ms Apurba Chakma, Laboratory Technician

Image (NGO), Chittagong

Dr Sabana, Programme Manager

Dr Shafiqul Islam, Medical Officer

Md Wahidul Islam,
Monitoring & Evaluation Officer

Md Mahbubul Alam, Laboratory Technician

Mr Khairul, Field Supervisor

***Upazila* Health Complex, Hathazari, Chittagong**

Dr Salauddin Mahmud, UH&FPO

Dr Sk Fazle Rabbi, Medical Officer
(Disease Control)

Md Sharif, LTCA

Mr Bijoy Kumar Das, Programme Organizer, BRAC

Mr Subol, Programme Organizer, BRAC

Mr Rafiqul Islam, Upazila Manager, BRAC

Kazi Nurun Nabi, Sr Health Coordinator, BRAC

***Upazila* Health Complex, Raozan, Chittagong**

Dr Kazi Ali Akbar, UH&FPO

Dr Kazi Saiful Islam, Medical Officer
(Disease Control)

Kazi Md Noor Hossain, LTCA

Mr Sirajul Islam, Programme Organizer, BRAC

Mr Shohag Chandra Das,
Programme Organizer, BRAC

Mr Sumon Das, Programme Organizer, BRAC

Mr Masudul Haque, Upazila Manager, BRAC

TEAM III: RAJSHAHI DIVISION

***Upazila* Health Complex, Ranishankhail, Thakurgaon**

Dr Md Anisur Rahman, UH&FPO

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

Dr David Pahan, Programme Director, DBLM

Mr Delwar Hossain, Project Manager (TB), DBLM Thakurgaon

Ms Anwara Begum, TLCS, DBLM

Md Raihan Sharif, TLCA, DBLM

Mr Suresh Roy, Laboratory Assistant, DBLM

Civil Surgeon Office, Thakurgaon

Dr M.A. Mannan, Civil Surgeon

Md Anisul Haque, Chief Laboratory Technician

Thakurgaon CDC

Dr Md Khairul Kabir, Junior Consultant

***Upazila* Health Complex, Thakurgaon Sadar**

Dr Nurul Huda, UH&FPO

Mr Simon Mardy, TLCS, DBLM

Mr Silimon, Laboratory Technician, DBLM

Ms Kanchani Rani, Laboratory Technician, DBLM

Md Hassan Reza, TLCO, DBLM

Civil Surgeon Office, Dinajpur

Dr Azizur Rahman, Civil Surgeon

Dr Younus Ali, Deputy Civil Surgeon

Dr MA Jahidul Islam, Medical Officer

Mr MA Razzak, PO

Md Asadul Haque, Sr HEO

Mr Bilwa Das Saha, Senior RHC, BRAC

Mr Kohitur Aum, RHC, BRAC

Dinajpur CDC

Dr Md Atiqur Rahman, Jr Consultant in-charge

Mr Pradeep Kumar Roy, Laboratory Technician, BRAC

***Upazila* Health Complex, Dinajpur Sadar**

Dr Iqbal Hossein, UH&FPO

***Upazila* Health Complex, Birganj, Dinajpur**

Dr Md Abdul Karim, UH&FPO

Dr Manindara Nath, RMO

Dr Fazle Elahi, MO(DC)

Md Rafiqul Islam, TLCA

MD Zikrul Haque, Med. Tech. (Lab.)

Md Abdur Rakib, *Upazila* Manager, BRAC

Ms Taslima Begum, PO, BRAC

Dr Ahemd Parvez Jabeen, TO, BRAC

Ms Anika Khatun, PO, BRAC

Dinajpur Medical College Hospital

Dr Nawshin Jahan, MO, BRAC

Md Gulam Morshed, PO, BRAC

Dr Shantonu Basu, Private Practitioner

LAMB Hospital, Parbatipur, Dinajpur

Dr Nelson Mandal, Deputy Medical Director

Dr Anup Kumar Das, TB Control Officer

Ms Enos Soren, PRO

Civil Surgeon Office, Lalmonirhat

Dr AYM Fazle Rashid, Civil Surgeon

***Upazila* Health Complex, Lalmonirhat Sadar**

Dr Saiful Haque, UH&FPO

Dr Bipul Chandra Sarker, MO, RDRS

Dr Ariful Haque, MO, RDRS

Mr Moshiuzzaman, Trainer, RDRS

Md Shakhwat Hossain, Monitoring Officer, RDRS

Md Suruzzaman, Laboratory Technician (EQA), RDRS

Mr Rajib Khan, Laboratory Technician, RDRS

Md Faridul Haque, Asst Manager (Health), RDRS

***Upazila* Health Complex, Kaliganj, Lalmonirhat**

Dr Mahmudul Hassan, UH&FPO

Ms Morium Begum, TLCA, RDRS

Mr Jibon Krishna, TLCA, RDRS

Md Abdus Sattar, TLCA, RDRS

Md Sahidul Islam, Laboratory Technician, RDRS

LEPRA Central Laboratory, Sirajganj

Dr Md Mojibur Rahman, Medical Adviser, LEPRA

Ms Isthara Hasda, Laboratory Technician, LEPRA

Sushanto Mahato, Laboratory Technician, LEPRA

TEAM IV: BARISAL DIVISION AND GREATER FARIDPUR

TARC Barisal

Dr Abdul Basit, Director (Health), Barisal Division

Dr Babul Chandra Biswas, MO(TB), BRAC

Dr Subrata Biswas, MO(QA), BRAC

Mr Chittaranjan Howlader, RHC, BRAC

Mr Sushanto Biswas, RHC, BRAC

Md SM Golam Sarwar, QA

Md Humayun Kabir, Sr Health Coordinator

***Upazila* Health Complex, Bakerganj, Barisal**

Dr Kaniz Fatema, MO

Md Abdul Jalil, LTCA
Md Abdul Awal, Med. Tech. (Lab)

Ms Piara Begum, Shasthya Shebika, BRAC

TB patient

BRAC office, Bakerganj, Barisal

Ms Parveen Akther, *Upazila* Manager, BRAC

Mr Shukhoranjan Kundo, RHC

Mr Shukhondo Chatterji, QA

Civil Surgeon Office, Patuakhali

Dr Humayun Kabir, Civil Surgeon

Dr Wahidul Kabir, UH&FPO, Patuakhali Sadar

Dr Jogon Nath, MO(DC) and in-charge Patuakhali CDC

Kuakata

Sonali Rani, Shasthya Shebika, BRAC

Ms Shumana Boiddo, Programme Organizer, BRAC

TB Patient

Pollichikishok

***Upazila* Health Complex, Kalapara, Patuakhali**

Dr Jasimuddin Khan, UH&FPO

Dr Zakia Sultana, MO

Dr MA Matin, MO(DC)

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

Ms Tahmina Begum, Programme Organizer, BRAC

Bhabo Ranjan Biswas, Village Doctor

Barisal CDC

Dr Moklesur Rahman, TB Consultant

Dr Md Siddiqur Rahman, Jr Consultant

Dr Rehana Ferdous, Medical Officer

Md Sekandar Ali, Med. Tech. (Lab.)

Ms Anjana Pal, Programme Organizer, BRAC

TB Hospital, Barisal

Dr Md Murtuza Alam, Deputy Civil Surgeon

Dr Md Hasanuzzzazmn, Medical Officer

Ms Nazneen Begum, Staff Nurse

Sher-e-Bangla Medical College Hospital, Barisal

Dr Md Maniruzzaman, Director

Ms Minoti Sammader, Programme Organizer, BRAC

Md Delwar Hossain, Programme Organizer, BRAC

***Upazila* Health Complex, Banaripara, Barisal**

Dr Md Alamgir Hossain, UH&FPO

Md Abdur Razak LTCA

Ms Sheila Majumdar, Med. Tech. (Lab.)

Ms Ranjita Das, Programme Organizer, BRAC

Civil Surgeon Office, Jhalokhati

Dr Md Jahangir Hossain, Civil Surgeon

Dr Jahangir Alam, RHC, BRAC

***Upazila* Health Complex, Kalkini, Madaripur**

Dr Md Azizul Islam, Civil Surgeon

Dr Md Abdur Rouf, UH&FPO

Mr Himangshu Karmokar, Project Director, DF

Dr Tulshi Das, Medical Officer, DF

Md Mahabubuzzaman, Sr TLCO, DF

Ms Soma Biswas, TLCA, DF

Md Masud Karim, TLCA, DF

Md Humayun Sheikh, TLCA, DF

Ms Shati Akhter, Clinic Assistant, DF

Shukur Mohammed, Village Doctor

Madaripur CDC

Md Kaikuzzaman, TLCA, DF

Ms Nahida Khan, TLCA, DF

Ms Parveen Akhter, Clinic Assistant

***Upazila* Health Complex, Rajoir, Madaripur**

Dr Md Golam Sarwar, UH&FPO

Md Haidar Hossain Mia, Med. Tech. (Lab.)

Ms Shilpi, Med. Tech. (Lab.)

Md Shorab Hossain Mollah, LTCA

Ms Monica Rani Halder, TLCA, DF

Mr Ashish Kumar Bala, TLCA, DF

Faridpur Medical College Hospital

Mr Paritosh Chandra Dhai, TLCO, DF

Md Shafiqul Islam, TLCA, DF

Md Ziakob Hossain, TLCA, DF

Ms Shafin Parveen, Clinic Assistant, DF

TEAM V: KHULNA DIVISION

Khulna CDC

Dr Shaikh Abdul Kadir, Jr Consultant

Moinuddin Gazi, Storekeeper

Ms Sabina Yasmin, Med. Tech. (Lab.)

Ms Jamuna Biswas, Laboratory Technician (EQA), BRAC

Civil Surgeon Office, Khulna

Dr AKM Abdus Samad Miah, Civil Surgeon

Dr Maksuda Begum, Deputy Civil Surgeon

Dr Kaniz Sultana, MO(CS)

Khulna Medical College Hospital

Dr Md Golam Hossain, Superintendant

Ms Saleha Khatun, Programme Organizer, BRAC

Mr Nirmal Kumar Paul, Programme Organizer, BRAC

***Upazila* Health Complex, Dumuria**

Dr Ataur Rahman Rizvi, UH&FPO

Dr Atiur Rahman Shaikh, MO(DC)

Dhiman Boidya, *Upazila* Manager, BRAC

Modhusudon Dey, District Health Coordinator, BRAC

Patient

Shamim Pharmacy and two adjacent pharmacies, Khulna

Dr Shaikh Md. Rizwan, Medicine Specialist, Private Practitioner

BRAC Regional Store, Khulna

Shaikh Azmal Hossain, RHC, BRAC

Sk. Mahmudul Hasan, RHC, BRAC

Ms Fahmida Khatun, RHC, BRAC

PIME Sisters, Khulna

Sr Annamaria Panza, Superintendant

Dr (Sr) Lorella Pecorini, Medical Officer

Sr Flora Purification, Health worker

***Upazila* Health Complex, Shalikha, Magura**

Dr Akhtaruzzaman, UH&FPO in-charge

Md Jaber Ali, *Upazila* Manager, BRAC

Patient

Ms Rebeka, Shasthya Shebika, BRAC

Ms Maju Bibi, Shasthya Shebika, BRAC

Civil Surgeon Office, Magura

Dr KAM Mahfuzul Kabir, Civil Surgeon

Dr Alimuzzama, MO(DC)

Central Medical Stores Depot, Dhaka

Brig. Gen. Dr Bazle Kader, Director

Dr Md Giasuddin, Deputy Director

Md Arifur Ahsan, Accounts Officer

Md Fasiul Alam, Storekeeper

Shyamoli Central Store

Md Liakot Ali, Storekeeper

Ms Happy, LTCA

Essential Drugs Company Ltd.

Col Md Mehboobul Haque, Managing Director

Mr Ferozul Alam, Director (Production)

Md Mahbubul Haque Patwari, Manager (Marketing)

Drug Administration Department

Ms Nayer Sultana, Pharmacist

Novartis

Md Munshi Siraj Uddin, Director (Technical Operations)

Md Enayet Ullah Khan, Head (Marketing)

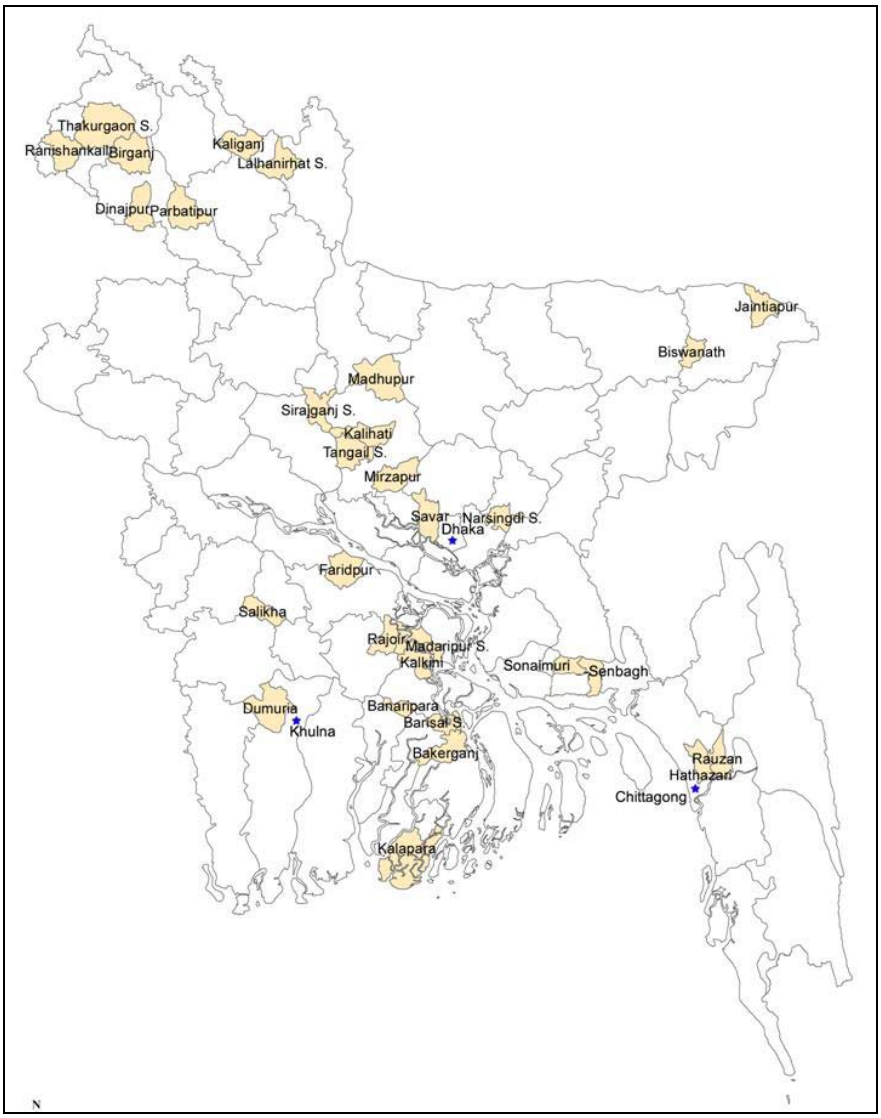
Mr Tapash Kumar Saha, Portfolio Executive

Balaka Pharmacy, Gulshan-2, Dhaka

Dr Lutful Karim, Private Practitioner

Annex 4

Map of Bangladesh indicating *upazilas* and cities visited



Annex 5

Tuberculosis training activities in 2006 and 2007 (Jan-Sep) conducted by NTP

Course	Duration (in days)	Category of participants	No. of participants	
			2006	2007
TB Management at district level (WHO modules)	6	UH&FPO MO(DC) MO(TB/Leprosy) Junior consultant CDC	868	141
Quarterly Monitoring Meeting	1	Mid-level managers from government and NGOs	13 995	4 221
Mid-level course on DOTS	3	Sanitary Inspector Health Inspector Medical Assistant Statistician Pharmacist District Storekeeper Lady Home Visitor Assistant. Nurse (TB clinic) Paramedics (NGOs)	2 956	1 260
Field-level course on DOTS	1	Assistant Health Inspector Health Inspector *Upazila* Storekeeper Counsellor (NGOs) Senior service promoter and service promoter (NGOs)	20 129	17 494
Laboratory course on AFB microscopy	6	Medical Technologist (Laboratory)	579	276
Laboratory EQA	6	Med. Tech. (Lab.)	43	0
Laboratory supervision	5	Medical and non-medical supervisors	23	105
Training on DOTS	3	Programme Organizer and LTCA	31	0
DOTS orientation	1	General Practitioners	1 959	755
DOTS orientation and advocacy workshop	1	Faculty of Medical Colleges	828	390
Partners meeting; Strategic workshop	1	Government-NGO representatives	152	500
DOTS orientation, Sadar Hospital	1	All staff (paramedics, consultants)	550	1 805
Total			**42 113**	**26 927**

Annex 6

Operational research conducted by NTP and partners

Name of the organization	Research areas
ICDDR'B	• Nationwide TB Prevalence Survey. • Epidemiological studies on TB • Monitoring anti-microbial resistance patterns • Health-care utilization patterns • Follow-up of sputum negative cases • Molecular and immunological study of TB • Development of rapid diagnostic tests • Prevalence of HIV among TB patients • To study TB-related mortality
BRAC	• Community-based DOTS • Coverage evaluation of DOTS • Cost-effective analysis • Gender and TB • Stigma • Delay in diagnosis and treatment • Urban TB control • Sources of TB information and people perception
Damien Foundation	• Drug resistance monitoring • MDR contact survey • Study on acquisition of drug resistance under various standard TB treatment regimens • Treatment of MDR-TB cases
University of Leeds, UK	• Public private mix
URC	• Drug supply management • TB/HIV
RIT	• Public private mix