Review of the National Tuberculosis Programme of Bangladesh

16-28 November 1997

Conducted by the Government of Bangladesh and the World Health Organization
Contents

Executive Summary and Recommendations .................................................. 3
   Major Recommendations ......................................................................... 5
Next Steps .................................................................................................. 6
Report on Joint Review of the National Tuberculosis Programme ..................... 7
   Introduction .......................................................................................... 7
   Objectives ............................................................................................. 7
   Methodology ......................................................................................... 7
   Background Information of Bangladesh .................................................. 8
   Epidemiology of Tuberculosis and Anticipated Impact of HIV ..................... 9
   Recommendations .................................................................................. 11
NTP Organization and Structure .................................................................... 12
Budget and Expenditure .............................................................................. 16
Diagnostic Services ..................................................................................... 17
Treatment and Case Management ................................................................. 19
Recording, Reporting and Monitoring .......................................................... 24
Training ..................................................................................................... 26
Supervision ................................................................................................. 28
Logistics ...................................................................................................... 29
Health Education and Advocacy ................................................................... 32
Research ..................................................................................................... 34
Cooperation with Other Partners ................................................................... 35
Annexes ....................................................................................................... 38
   Annex 1: List of Reviewers .................................................................... 38
   Annex 2: Places Visited and people Met ................................................. 39
   Annex 3: Map of Bangladesh .................................................................. 43
   Annex 4: Organizational Chart of the Ministry of Health and Family Welfare, with
   special reference to the NTP ................................................................... 44
   Annex 5: Fading of fuchsin stain
      (a) AFB still visible at 30°C .................................................................. 45
      (b) AFB still visible at 40°C .................................................................. 46
   Annex 6: Summary of Case Finding, Smear Conversion and Treatment Outcome
   Data ......................................................................................................... 47
   Annex 7: Abbreviations ......................................................................... 48
Executive Summary and Recommendations

Achievements

The National Tuberculosis Programme (NTP) has made remarkable progress in the last four years. The DOTS strategy was introduced in four thanas in November 1993, and has now expanded to cover 363 thanas, reaching 78% of the population. More than 150,000 people with tuberculosis have been diagnosed and treated since the programme began, with treatment success rates maintained at about 80%.

Recent estimates suggest that 2.3% of the population of Bangladesh becomes infected with tuberculosis every year, and about 300,000 people progress to develop disease annually. About half of these have infectious pulmonary tuberculosis, and continue to spread the disease. In 1996, a total of 63,985 cases of tuberculosis were registered by the NTP, representing 21% of the estimated incidence. The limited information available on drug resistance suggests that multidrug resistant tuberculosis (MDRTB) is not yet a major problem, however, the potential clearly exists for this to become a threat to tuberculosis control in the future.

Recognizing the significant burden of this disease, the Government of Bangladesh (GoB) identified tuberculosis control as a high priority in the Fourth Population and Health Project 1992-1998 (FPHP). Tuberculosis/Leprosy is one of the largest projects within the FPHP, with a budget of $17.2 million. This ensured that sufficient staff, drugs and other supplies have been made available throughout the country. The programme is financially supported by the Government of Bangladesh, the Dutch Government and the World Bank, with technical assistance from WHO, which is the executing agency for 21 health and health related projects of the FPHP.

A further contributing factor to the success of the NTP is the close cooperation with Non Governmental Organizations (NGOs) who are assisting DOTS implementation in a third of the areas covered. BRAC, the Damien Foundation, the Danish-Bangladesh Leprosy Mission, HEED, Lamb Hospital, and RDRS are currently working in partnership with the NTP.

The unit of management for DOTS implementation is the Thana Health Complex (THC), or equivalent NGO facility, serving a population of approximately 250,000 people. Sputum smear microscopy is the main diagnostic tool to detect infectious cases of tuberculosis amongst people with respiratory symptoms. Treatment delivery to confirmed cases of tuberculosis is generally provided at THC's or through trained peripheral health workers, community volunteers or village leaders at community level. The aim is to provide free treatment as close to the patient's home as possible through innovative methods of directly observed treatment to ensure that patients complete their full course of treatment and are cured.

Since 1993, nearly 30,000 health workers of various cadres in all levels of the health system have been trained in the DOTS strategy. There is an excellent recording and reporting system to monitor patients on treatment. An analysis of over 4,000 patients records from 3-month cohorts registered in the same periods of 1995, 1996 and 1997 in the six divisions of Bangladesh showed that 59% of new patients were infectious,
or sputum smear positive, 90% had become smear negative, or non infectious, within 2 months of treatment, and 84% successfully completed their treatment.

The key factors in the success of the NTP have been:

1. Government commitment, including technical and financial resources
2. Utilization of the existing health service infrastructure
3. The technical assistance and supportive role of WHO as executing agency
4. Extensive training of health workers
5. Regular supplies of drugs and other materials
6. Partnership with NGOs
7. The well maintained recording and reporting system

The excellent results achieved in many parts of the country make this programme an attractive field-training site for neighbouring countries, to learn from the experiences with DOTS in Bangladesh.

Future Challenges

In order to build on the success achieved so far, the current level of support provided by the Government of Bangladesh, the WHO and the World Bank must be maintained, and several areas (described below) strengthened to meet the further challenges that lie ahead. The success of the NTP is still not fully appreciated within the country, and attention needs to be drawn to the achievements of this programme within the health sector. This will lead to increased collaboration with other important stakeholders, such as professional health organizations, academic institutions, allied Ministries, NGOs, the private sector and donors.

To ensure sustainability of this programme, a greater sense of ownership has to be developed at all levels of the health service. Opportunities for increasing the involvement of the Divisional Directorate of Health and the District Civil Surgeons Office in the management of the programme include quality control of smear microscopy, storage and distribution of drugs, training and supervision, reporting and feedback.

Presently, less than a quarter of people with tuberculosis are treated with DOTS, whilst the remainder are receiving inadequate care in the private sector, or not treated at all. As high cure rates are now being achieved, the next priority is to increase the number of people treated under the DOTS strategy. This will require an extensive health education campaign to increase community awareness and encourage doctors working in the private sector to refer patients for treatment. Although DOTS has been introduced in most thanas, intake of every dose of medication at THC's is directly observed in less than half of patients. Further involvement of sub-centres and Family Welfare Centres would greatly facilitate supervised treatment delivery.

The achievements of the NTP are mainly evident in rural areas. Although TB clinics in urban areas are now implementing DOTS, they do not meet the needs of all patients living in towns and cities. The indiscriminate and uncontrolled use of anti-tuberculosis drugs, which are widely available in urban areas, poses a serious threat, as it will rapidly lead to the emergence of multi drug resistance. An adequate strategy and plan...
for tuberculosis control in urban areas must be developed in collaboration with the City Corporations, Ministry of Local Government, Rural Development and Cooperatives (LGRD), and the private sector. Furthermore, the involvement of the TB hospitals in the NTP needs to be strengthened.

Several areas of weakness in supervision and monitoring should be addressed by the programme. An extensive laboratory network has been established but lacks adequate supervision and quality control. A central reference laboratory for sputum culture and sensitivity testing, and surveillance of drug resistant tuberculosis should be developed. Lack of transport hinders supervision at most levels. Finally, feedback systems based on the reports prepared by the THCs have yet to be developed. These reports should be used as a management tool to monitor programme performance and take corrective action.

The NTP has demonstrated that effective tuberculosis control services can be delivered within the existing health care system of Bangladesh. While a number of challenges lie ahead, there is now a window of opportunity for the health services to further integrate a successful disease control programme into the Health and Population Sector Strategy proposed for the Fifth Health and Population Programme (HAPP-5). The combination of a significant burden of disease, primarily affecting the poor and disadvantaged, and the availability of a highly cost effective control strategy, makes this a clear priority for intervention in HAPP-5.

**Major Recommendations**

1. The Government of Bangladesh should continue to expand DOTS to cover all thanas in Bangladesh, ensuring that the current level of financial and technical resources, from the Government of Bangladesh WHO, World Bank and other development partners are maintained.

2. The Ministry of Health and Family Welfare should integrate tuberculosis control into the Health and Population Sector Strategy proposed under HAPP-5, through the involvement of managerial and technical staff at the divisional, district, thana, union and community levels, particularly in training and supervision.

3. The NTP should conduct an education campaign to raise awareness about tuberculosis control in the community, and amongst doctors working in the private sector, in order to increase case finding. The NTP should also broaden collaboration with other stakeholders, such as allied Ministries, NGOs, professional associations, academics, and the private sector, in order to promote DOTS.

4. The NTP should develop an appropriate strategy and work plan for tuberculosis control in urban areas, in collaboration with the City Corporation, Ministry of LGRD, and the private sector.
<table>
<thead>
<tr>
<th>Action</th>
<th>Responsibility</th>
<th>Time</th>
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<tbody>
<tr>
<td>Improve the Quantity and Quality of Supervisory visits</td>
<td>MBDC</td>
<td>21-24 Dec 97</td>
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<tr>
<td>Identify thanas where NTP performance is unsatisfactory, and actions</td>
<td>MBDC &amp; DGHS</td>
<td>end Dec 97</td>
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<tr>
<td>needed</td>
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<tr>
<td>Develop and implement a plan of supervision for 1998 from the central</td>
<td>MBDC</td>
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<td>level to ensure that all senior project and revenue staff of the MBDC</td>
<td>MBDC &amp; DGHS</td>
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<td>spend 5 days per month on supervisory visits, with a priority to</td>
<td>MBDC</td>
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<tr>
<td>expansion thanas</td>
<td>MBDC</td>
<td>end Dec 97</td>
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<tr>
<td>Develop a revised supervisory check list and report</td>
<td></td>
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<tr>
<td>Quality Control of Smear Microscopy</td>
<td>MBDC, NPHL &amp;</td>
<td>15 Jan 98</td>
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<tr>
<td>Develop a plan and protocol for quality control system for smear</td>
<td>DGHS</td>
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<tr>
<td>microscopy, including needs assessment</td>
<td>MBDC</td>
<td>end Mar 98</td>
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<tr>
<td>Train district CLT in QC system</td>
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<tr>
<td>Prepare a proposal and justification for order of additional vehicles</td>
<td>MBDC</td>
<td>15 Dec 97</td>
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<tr>
<td>for NTP</td>
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<tr>
<td>Prepare revised proposal and tender for anti-tuberculosis drugs and</td>
<td>MBDC</td>
<td>1-15 Dec 97</td>
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<tr>
<td>other supplies for 1998 and 1999</td>
<td></td>
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<tr>
<td>Training</td>
<td>MBDC</td>
<td>mid Jan 1998</td>
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<tr>
<td>Revise training plan, based on requirement for increased training of</td>
<td>MBDC</td>
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<tr>
<td>equivalent person to LTCA</td>
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<tr>
<td>Implement a training plan for responsible person at thana level,</td>
<td>MBDC</td>
<td>end April 98</td>
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<tr>
<td>to replace LTCA</td>
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<td></td>
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<tr>
<td>Develop and conduct a supervisory skills training course for revenue</td>
<td>MBDC</td>
<td>end April 98</td>
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<tr>
<td>staff at the district, divisional and central levels</td>
<td></td>
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<tr>
<td>Contract with professional organization to translate WHO modules into</td>
<td>MBDC</td>
<td>mid Jun 98</td>
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<tr>
<td>Bengali</td>
<td></td>
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<tr>
<td>Quality Control of TB medicines</td>
<td>MBDC, DDA &amp; DGHS</td>
<td>end Dec 97</td>
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<tr>
<td>Decide on fate of excess isoniazid/thiacetazona</td>
<td></td>
<td>end Apr 98</td>
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<tr>
<td>Determine a policy of quality control of anti-TB medicines</td>
<td></td>
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<tr>
<td>Create a feedback cell at the central MBDC to analyse and provide</td>
<td>MBDC</td>
<td>15 Feb 98</td>
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<tr>
<td>quarterly feedback to districts and divisions</td>
<td></td>
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<tr>
<td>Urban TB Control</td>
<td>MBDC, City</td>
<td>end Dec 97</td>
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<tr>
<td>Form a task force involving all concerned parties to develop a</td>
<td>Corporation,</td>
<td></td>
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<tr>
<td>strategy and plan for urban TB control in the four major cities</td>
<td>MoLGRD, ADB</td>
<td></td>
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<tr>
<td>Finalize plans for urban TB control</td>
<td>NGOs &amp; others</td>
<td>end Mar 98</td>
</tr>
<tr>
<td>Coordination</td>
<td>MBDC &amp; NGOs</td>
<td>end Dec 97</td>
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<tr>
<td>Establish quarterly coordination meetings with NGOs with a note for</td>
<td>MBDC</td>
<td>end Dec 97</td>
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<tr>
<td>the record</td>
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<tr>
<td>Organize a monthly meeting of NTP managers/consultants from central</td>
<td>MBDC</td>
<td>end Apr 98</td>
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<tr>
<td>and divisional levels</td>
<td></td>
<td>24 Mar 98</td>
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<tr>
<td>Involve additional NGOs in NTP</td>
<td>MBDC</td>
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<tr>
<td>Hold a national dissemination meeting to publicize results of review,</td>
<td>MBDC</td>
<td>1 Feb 98</td>
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<tr>
<td>involving DGHS, NGOs and professional organizations</td>
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<tr>
<td>Inform private practitioners of results of review and availability of</td>
<td>MBDC</td>
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<td>free anti-TB medicines through an article published in the BMA journal</td>
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<tr>
<td>Hold a joint meeting with relevant NGOs to revise the plan for</td>
<td>MBDC &amp; NGOs</td>
<td>21 Jan 98</td>
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<tr>
<td>expansion, based on a realistic assessment of training and supervision</td>
<td></td>
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<tr>
<td>capacity</td>
<td></td>
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<tr>
<td>Hold a joint meeting with interested organizations to prioritize TB</td>
<td>MBDC</td>
<td>end Jan 97</td>
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<tr>
<td>related surveillance and research needs</td>
<td></td>
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<tr>
<td>Develop a strategy and plan for TB-related BCC</td>
<td>MBDC, HEB, DGHS</td>
<td>end April 98</td>
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<tr>
<td>Finalize 5-year NTP plan, based on HAPPS organizational changes</td>
<td>MBDC</td>
<td>end Oct 98</td>
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</table>
Report on Review of the National Tuberculosis Programme

Introduction

In 1991 the revised National TB Programme (NTP) in Bangladesh was established following a feasibility study performed in 1990 by the World Bank. The DOTS strategy was adopted in 1992, and field implementation began in November 1993 in 4 pilot thanas. Since then it has rapidly expanded to cover 363 thanas (78% of the country).

The NTP is presently a component of the Fourth Population and Health Project (FPHP), as "Further Development of TB/Leprosy Control Services" under the Directorate General of Health Services (DGHS). It is financed by the Government of Bangladesh (GoB), the International Development Agency/World Bank (IDA) and the Dutch Government. The FPHP is due to end in June 1998 and the MoHFW requested assistance from WHO to conduct a joint review of the NTP.

This review comes at a critical time as coverage of the country with TB control services nears completion and as the planning of the Fifth Health and Population Programme (HAPP-5) is being finalized. The recommendations of this review will contribute to the development of the Health and Population Sector Strategy of HAPP-5.

Objectives

To identify strengths and weaknesses and to develop recommendations which can be included in the next five-year plan of the NTP under HAPP-5. These include:

1. Analysis of the TB burden in Bangladesh
2. Review of the NTP structure, policies, procedures and resources
3. Analysis of NTP achievements and constraints
4. Recommendations to strengthen the NTP

Methodology

Four teams of reviewers carried out field visits in the six different divisions of Bangladesh. 28 thanas in 26 districts, three TB hospitals, 11 TB clinics, three urban clinics, and six NGO projects were visited.

Each team consisted of four members; two international and two national consultants (see Annex 1). The selection of international consultants was based on their previous experience in Bangladesh, and the specific priority areas for evaluation. National representatives from the MoHFW, the DGHS and the main NGOs assisting the NTP were included in the review teams. Prior to the field visits, the review teams were briefed on different aspects of the NTP, as well as logistical arrangements and use of the standardized data collection forms. The NTP informed all Civil Surgeons in advance about the field visits. The thanas were selected in consultation with the Civil Surgeons and the divisional consultants (WHO), who accompanied each team in their respective divisions to facilitate communication, ensure logistics and provide support to rapporteurs of the teams. The teams visited health offices at the divisional, district and
than level, and observed TB control services in TB hospitals, TB clinics and Thana Health Complexes (THC). In each place visited, the teams looked at the reporting system, the drug store and the laboratory, and talked with the relevant staff and authorities as well as community members, patients, and private practitioners (see Annex 2). The team visiting Dhaka division also included interviews with senior government officials and representatives of donor agencies. Following the seven-day visits, each team prepared and presented a field report with recommendations. Based on these reports and recommendations by the teams, a consolidated report was prepared in close collaboration with the Director, Mycobacterial Diseases Control (MBDC) and his staff. This report includes an outline of the plan of activities and the next steps to be undertaken during 1998 as a follow up of the review.

The executive summary and recommendations were presented to the Director General of Health Services and senior officials of the MoHFW. A press briefing to disseminate the review findings was held and attended by the Minister of Health and the WHO Representative. The Minister publicly declared the government’s continued commitment to tuberculosis control, and confirmed that it would be a top priority within HAP-5.

**Background Information of Bangladesh**

Bangladesh is situated in the eastern Indian subcontinent, north of the Bay of Bengal and crossed by the rivers of the Ganges delta (see Annex 3). The surface area is 147,570 km². The population in 1997 was estimated at 123.7 million, making it one of the most densely populated countries in the world with 838 inhabitants per km² (if rivers and forests are excluded it exceeds 1000 inhabitants per km²). The majority (86%) of the population lives in the rural areas. There are only a few large cities of which Dhaka (6.95 million), Chittagong (2.35 million), Khulna (1.0 million) and Rajshahi (0.5 million) are the most important. Sixty percent of the population is aged 15 years or under, and only 5% are over 60 years old. The GNP per capita is US$ 230. The literacy rate of the population aged five years and older was 37.2% in 1995 (44% in men and only 23 % in women). Forty-four percent of the population aged 10 years and older were economically active, with 57% engaged in agriculture, and 31% working in trade.

The country follows a parliamentary form of democratic government headed by the President, Prime Minister, Ministers, and Members of Parliament. The executive power is with the Prime Minister. For a summary of the administrative structure of the country, see the accompanying table. Additionally, there are 103 municipalities and 4 city corporations in the 4 main cities (Dhaka, Chittagong, Khulna, and Rajshahi). City Corporations and GoB urban dispensaries are responsible for providing health care to the urban population of the main cities. There is an extensive private sector in urban areas, which also provides primary, secondary and tertiary health care.
Epidemiology of Tuberculosis and Anticipated Impact of HIV

Epidemiology of tuberculosis

As part of the review, an extensive re-evaluation of the secondary data available on TB epidemiology, anti-TB drug resistance and HIV infection in Bangladesh was carried out, and made available as a separate report (Weyer K. Tuberculosis in Bangladesh 1996. Report prepared for the Bangladesh Tuberculosis Review. World Health Organization, Dhaka: November 1997). Due to the lack of recent epidemiological information, estimates of the extent of the tuberculosis problem in Bangladesh cannot be made with a great deal of certainty. Based on an evaluation of previous surveys on tuberculosis prevalence conducted in 1964-66 and 1987-88, using different epidemiological models, together with available tuberculosis data from the official disease notification system and quarterly reports, the Annual Risk of Tuberculous Infection (ARTI) is estimated to be 2.27%. From these estimates, it would appear that at least 50% of the adult population of Bangladesh is infected with TB. This risk is similar to that reported from neighbouring countries in South-East Asia.

Assuming a relationship of 1% ARTI equivalent to 49 new smear positive cases per 100,000 population per year, the estimated overall incidence of new smear-positive tuberculosis cases in Bangladesh in 1996 is 111 per 100,000 population. With an estimated ratio of 1:1.22 between new smear-positive and smear-negative tuberculosis and a total population of 123,700,000, a conservative estimate of the burden of tuberculosis in Bangladesh in 1996 would be as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Estimated Cases</th>
</tr>
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<tbody>
<tr>
<td>New smear positive cases:</td>
<td>137,300</td>
</tr>
<tr>
<td>New smear negative and extra pulmonary cases:</td>
<td>167,500</td>
</tr>
<tr>
<td>Total new cases:</td>
<td>304,800</td>
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</tbody>
</table>

During 1996 a total of 63,985 tuberculosis cases were reported to the NTP as follows:

<table>
<thead>
<tr>
<th></th>
<th>Thanas</th>
<th>TB clinics</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New smear-positive patients</td>
<td>16,563</td>
<td>13,385</td>
<td>29,948 (46.8%)</td>
</tr>
<tr>
<td>Smear-positive relapse</td>
<td>593</td>
<td>375</td>
<td>968 (1.5%)</td>
</tr>
<tr>
<td>New smear-negative patients</td>
<td>6,877</td>
<td>22,857</td>
<td>29,734 (46.5%)</td>
</tr>
<tr>
<td>Extra-pulmonary patients</td>
<td>1,120</td>
<td>2,215</td>
<td>3,335 (5.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>25,153</td>
<td>38,832</td>
<td>63,985 (100%)</td>
</tr>
</tbody>
</table>

The overall case notification rates per 100,000 population were 24.8 for new smear-positive patients and 53.0 for all cases, with wide variation between the districts. In some districts the rate for new smear-positive cases was less than 10 per 100,000 population, while in other districts it was above 60. Because the programme has not yet expanded to cover all thanas, the estimated number of patients, if all thanas had reported, would be 48,500 for new smear-positive patients and 89,000 for all cases. This would correspond to case notification rates of 40.2 for new smear-positive cases and 73.8 for all cases and a case detection ratio of 35% of estimated new smear-positive patients and 29% of all cases (projected when nationwide coverage is reached). Given
the objective of the NTP to detect at least 70% of the existing cases, it is obvious that substantial improvement in case-finding will be required to reach this target.

Of the new smear-positive patients notified during 1996 the highest number of male patients was reported in the age group 35-44 years and the highest number of females in the age-group 25-44 years. Case-notification rates per 100,000 population show the highest rate for males, 110 per 100,000, in the age-group of 55-64 years and the highest rate for females, 24 per 100,000, in the age-group of 35-44 years. This age-sex distribution is typical of the pattern observed in the subcontinent.

The males to females ratio was 5:2 among smear-positive patients. Although a male predominance is observed in many high endemic tuberculosis countries, this ratio is quite striking. Whether this is a real reflection of the distribution of tuberculosis in the community or whether there is under-notification of females, e.g. due to reduced access to the health services, is not known.

It is estimated that about 52,000 deaths due to TB will occur in 1997. It is therefore the second most important cause of death due to an infectious disease, after diarrhoea. Of 10,211 new smear-positive patients who were treated in the THC's during 1994 and 1995, 611 (6%) were reported to have died. This case fatality is similar to that observed in NTPs in other developing countries. The TB clinics reported 65 deaths (less than 1%) among 9,690 new smear-positive patients. These results should be interpreted with caution, because of the high defaulter rate of 30%, and many of the deaths may have been reported as defaulters.

Drug Resistance

Two recent studies have been conducted on the prevalence of resistance to antituberculosis drugs (Infectious Diseases Hospital Dhaka, and Damien Foundation in the Greater Mymensingh District). However, sample sizes were small (116 and 645), and the surveys were not nationally representative. In the latter survey, conducted in a primarily rural area, rates of primary drug resistance were relatively low (H 5.4%, R 0.5%, S 3.7%, R+H 0.2%). Despite these findings, there is a great potential for emergence of multi-drug resistance in urban areas, due to the widespread availability and uncontrolled, indiscriminate use of anti-tuberculosis drugs in the private sector.

Impact of HIV infection on the tuberculosis epidemic in Bangladesh

The estimated prevalence of HIV infection in Bangladesh is still low (0.05% in 1994). However, under a moderate scenario, the cumulative number of HIV infections by the year 2000 is estimated to be 300,000, and annual new AIDS cases have been projected to increase to over 10,000 by the end of the century. Eighty people with HIV have been reported so far, and 12 cases of AIDS. Six of these have died, all of whom had TB. Bangladesh is still in the early stages of the HIV/AIDS epidemic and the full impact is

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1 This estimate is based on the following assumptions: Treatment: NTP 25% private sector 37.5%, 37.5% untreated. Mortality in smear positive cases: 6% NTP, 20% private sector, 50% untreated. Mortality in smear negative/extra pulmonary cases: 5% NTP, 5% private sector, 15% untreated.
expected in the next century. Plans to implement sentinel surveillance using unlinked anonymous testing of high-risk groups have yet to be implemented. The co-epidemic of HIV and tuberculosis will be severe, since more than 50% of adults are already infected with tuberculosis. It has been estimated that there will be an excess of 12,000 tuberculosis cases related to HIV infection by the year 2000.

Conclusion

TB contributes to the significant burden of disease in the country, with an estimated 300,000 new cases and 52,000 deaths occurring in 1997. Presently, the NTP detects only 21% of the estimated cases, implying that detection of more cases is a priority for the NTP after full coverage with DOTS is achieved in 1998. Furthermore, the burden of tuberculosis in the country should be better quantified through prevalence surveys.

There is a need to monitor drug resistance, particularly in urban areas, and to follow trends in HIV prevalence in people with TB.

The reasons for the marked gender difference in case finding require further investigation.

Recommendations

1. **The NTP should endeavour to increase case finding in thanas which have achieved satisfactory cure rates by:**
   a) **Increasing awareness in the community concerning symptoms, curability and availability of free TB treatment from THCs**
   b) **Improving quality of microscopy in the THC**
   c) **Training for all Medical Officers (MOs) in the THCs to identify and refer more TB suspects for sputum smear examination**
   d) **Training for more community level health workers and volunteers to identify and refer TB suspects**
   e) **Orientation for private practitioners to encourage referral of patients to the NTP**

2. **The NTP, in collaboration with the Bangladesh AIDS Prevention and Control Programme (BAPCP), should develop a sentinel surveillance system for HIV prevalence in TB patients**

3. **The NTP should establish a surveillance system for anti-tuberculosis drug resistance, once a National Reference Laboratory for TB is developed**

4. **The NTP should conduct prevalence surveys to quantify the burden of tuberculosis and investigate the reasons for the marked gender difference in reported cases of tuberculosis**
**NTP Organization and Structure**

The Ministry of Health and Family Welfare is divided into two directorates, the Health Directorate and the Family Planning Directorate (see Annex 4). The Mycobacterial Disease Control Directorate (MBDC), which is responsible for the National Tuberculosis Programme (NTP), is under the Directorate General of Health Services.

At the divisional level, a Director is responsible for coordinating activities of the health services. Five of the divisions have a full complement of technical and administrative staff, whereas Barisal division has only 15 staff (all administrative).

A Civil Surgeon heads each district health administration. At the district level there are General Hospitals, mostly with a capacity of 50-250 beds, and in few districts there are specialized hospitals and clinics (such as TB Hospitals, TB Segregation Hospitals, TB clinics).

At the thana level, the Thana Health Complex has 31 bedded inpatient capacity staffed by eight medical officers providing basic health care. At the union level there are static health and family planning facilities: namely Union Sub-centres and Family Welfare Centres. These union level facilities are primarily manned by paramedics: a Family Welfare Visitor (mainly for family planning services), a Medical Assistant and some supervisory staffs, such as Assistant Health Inspector and Family Planning Inspector. It is the policy of the Government of Bangladesh to post Medical Officers at the union level; this has so far been realized in about 7% of the Union Sub-centres. At the ward level there is a Health Assistant and a Family Welfare Assistant from the Family Planning wing. Technical facilities, such as X-ray and laboratory, are available at the Thana Health Complex, but not beyond that level.
<table>
<thead>
<tr>
<th>Level</th>
<th>Function</th>
<th>Facility</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Policy</td>
<td>Mycobacterial Disease Control Project</td>
<td>Director, MBDC</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resource Allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drug procurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training senior technical staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Co-ordination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Reference Laboratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divisional</td>
<td>Monitoring</td>
<td>Divisional Directorate of Health Services</td>
<td>Divisional Director of Health</td>
</tr>
<tr>
<td></td>
<td>Co-ordination</td>
<td>(TB Hospital)</td>
<td>Asst. Director, Disease Control*</td>
</tr>
<tr>
<td></td>
<td>Hospitalization (TB Hospital only)</td>
<td></td>
<td>MT (Lab)*</td>
</tr>
<tr>
<td>District</td>
<td>Training junior technical staff</td>
<td>Civil Surgeon’s Office</td>
<td>Civil Surgeon</td>
</tr>
<tr>
<td></td>
<td>Technical supervision</td>
<td></td>
<td>MO (TB/Lep.)</td>
</tr>
<tr>
<td></td>
<td>Laboratory quality control</td>
<td>(District TB Clinic)</td>
<td>Programme Organizer</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
<td>(Segregation Hospital)</td>
<td>CLT*</td>
</tr>
<tr>
<td></td>
<td>Co-ordination</td>
<td></td>
<td>MO Disease Control*</td>
</tr>
<tr>
<td></td>
<td>Case finding (TB Clinic)</td>
<td></td>
<td>District Health Education Officer*</td>
</tr>
<tr>
<td></td>
<td>Treatment (TB Clinic and segregation hospitals)</td>
<td></td>
<td>District Storekeeper*</td>
</tr>
<tr>
<td></td>
<td>Hospitalization (TB segregation hospitals only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thana</td>
<td>Case finding</td>
<td>Thana Health Complex</td>
<td>T&amp;HFPO</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td></td>
<td>MO</td>
</tr>
<tr>
<td></td>
<td>Reporting</td>
<td></td>
<td>LTCA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MT (Lab)</td>
</tr>
<tr>
<td>Union</td>
<td>DOT</td>
<td>Union Sub Centre</td>
<td>MO Sub Centre*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family Welfare Centre</td>
<td>MA*</td>
</tr>
<tr>
<td>Community</td>
<td>Referral</td>
<td>Wards and Villages</td>
<td>Health Assistant</td>
</tr>
<tr>
<td></td>
<td>Daily DOT</td>
<td></td>
<td>Community Health</td>
</tr>
<tr>
<td></td>
<td>IEC</td>
<td></td>
<td>Volunteers</td>
</tr>
</tbody>
</table>

- Not currently involved in NTP

TB services first began in 1952 with a TB clinic established in Dhaka city. From 1965 services were organized into 44 TB clinics, four TB Hospitals and eight TB Segregation Hospitals distributed in different districts of the country. In 1986, TB Services were operationally integrated with Leprosy Services under one Director, Mycobacterial Disease Control (MBDC). Following DOTS implementation in November 1993, a Memorandum of Understanding was signed between GoB and NGO to accelerate the expansion. There is excellent cooperation between GoB and NGO staff, with NGOs providing services in 131 (36%) of the 363 thanas currently implementing DOTS (see following table).
DOTS implementation by divisions, 1993-97

<table>
<thead>
<tr>
<th>Division</th>
<th>1993</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
<th>Total implemented (as of Nov 1997)</th>
<th>Total number of thanas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barisal</td>
<td>-</td>
<td>10</td>
<td>10</td>
<td>-</td>
<td>11 (all GoB)</td>
<td>31 (all GoB)</td>
</tr>
<tr>
<td>Chittagong</td>
<td>2</td>
<td>5</td>
<td>22</td>
<td>15</td>
<td>12 (all GoB)</td>
<td>56 (all GoB)</td>
</tr>
<tr>
<td>Dhaka</td>
<td>2</td>
<td>3</td>
<td>48</td>
<td>25</td>
<td>26 (GoB 50; NGO 54)</td>
<td>119 (GoB 54; NGO 65)</td>
</tr>
<tr>
<td>Khulna</td>
<td>-</td>
<td>9</td>
<td>21</td>
<td>11</td>
<td>17 (all GoB)</td>
<td>58 (all GoB)</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>-</td>
<td>9</td>
<td>33</td>
<td>41</td>
<td>7 (GoB 37; NGO 53)</td>
<td>123 (GoB 37; NGO 86)</td>
</tr>
<tr>
<td>Sylhet</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>18</td>
<td>24 (all NGO)</td>
<td>35 (all NGO)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4</td>
<td>36</td>
<td>137</td>
<td>95</td>
<td>91 (GoB 232; NGO 131)</td>
<td>460 (GoB 274; NGO 186)</td>
</tr>
</tbody>
</table>

At the central level the project has two WHO expatriate consultants (Medical Officer and Technical Officer) and two WHO national consultants (Project Manager and Training Coordinator) for TB. Their duties are monitoring and supervising activities relating to TB control.

At the divisional level, the project has eight WHO National Consultants. Their duties are monitoring and supervising activities of both diseases. The consultants are based at the divisional headquarters in Dhaka, Chittagong, Sylhet, Rajshahi, Khulna, and Barisal.

In most districts, the project has a MO (TB/Lep) supervising both components of the project. Due to attrition of recruited staff only 19 of the sanctioned 42 MO posts are currently in position. Plans to fill the remaining posts have been delayed by procedural difficulties. The MBDC has also engaged 31 Programme Organizers (PO) at the district level for coordinating TB and Leprosy activities.

The staff of TB Clinics and segregation hospitals have been trained and involved with the TB control project activities since 1995.

At thana level, TB and Leprosy work is integrated into primary health care (PHC). At the THC, the Thana Health and Family Planning Officer (TH&FPO) and a MO who is designated for disease control, diagnose and treat the cases. A LTCA (or equivalent paramedical health worker) maintains records and delivers treatment for TB and Leprosy patients. The MBDC has 60 LTCAs paid from the revenue budget and has recruited an additional 224 LTCAs from the development budget. Some LTCAs have been appointed to NGO supported thanas, where they are not specifically needed.

At the community level, Health Assistants (HA) and other community based paramedical health workers identify and refer TB suspects, provide directly observed treatment (DOT) to patients, and trace defaulters. In the Health and Population Sector Strategy of HAPPP-5 there is a proposal to amalgamate facilities such as Union Sub-

---

2 As of November 1997, a total of 363 thanas are implementing DOTS. By the end of 1997 another 23 thanas will initiate DOTS (GoB - 7 in Barisal, 6 in Chittagong and 4 in Dhaka; NGO - 3 by Damien Foundation in Dhaka and 7 by BRAC in Rajshahi). During 1998, the NGOs will expand DOTS in 44 thanas as follows: Dhaka (8 by Damien Foundation), Rajshahi (18 by BRAC, and 8 by Damien Foundation) and Sylhet (11 by REED). The remaining 35 thanas are in 3 hill districts of Chittagong Division and GoB should assess the potential to incorporate DOTS along with the Special Action Programme for leprosy in these districts. However, the main priority in Chittagong division is to increase sputum smear conversion and treatment outcome results in the poorly performing thanas as well as the Chittagong urban project.
centres and Family Welfare Centres (FWCs) as Health and Family Welfare Centres at union level and establish Satellite Outreach Centres at community level. These could potentially be involved in case detection and treatment delivery. In few thanas the sub-centres at union level already function as DOT treatment points for TB, and it is proposed to use them for Leprosy MDT delivery in highly endemic areas.

<table>
<thead>
<tr>
<th>Year</th>
<th>Admissions</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>505</td>
<td>8</td>
</tr>
<tr>
<td>1995</td>
<td>538</td>
<td>21</td>
</tr>
<tr>
<td>1996</td>
<td>493</td>
<td>12</td>
</tr>
</tbody>
</table>

Institutions specifically designated for TB control exist at divisional and district levels. Four TB hospitals at the divisional level have 50-100 beds for TB patients, but lack outpatient facilities. They admit patients for the-intensive phase of treatment - usually 2 months - and then refer them to the THCs for follow up. The accompanying table shows the number of admissions and deaths recently reported from the TB hospital in Khulna. Eight segregation hospitals at the district level have up to 20 beds. These hospitals are not under the administrative control of the MBDC, and most do not use the NTP reporting system. Since they treat a considerable number of patients it is necessary that they are brought into the NTP as soon as possible.

Urban TB control services are limited at present to those provided by TB clinics and sadar thanas. Some efforts have been initiated in Chittagong. The NTP should involve the various stakeholders such as the Ministry of Local Government Rural Development and Cooperatives (LGRD), City Corporation, Municipality authorities, Asian Development Bank (ADB), private sector, academic institutions and NGOs, in developing strategies and plans for TB control in all the major urban centres of Bangladesh. An ADB project in the four largest cities of Dhaka, Chittagong, Khulna and Rajshahi is designed to provide primary health care services in which TB is included.

Conclusion

The present NTP management structure is a vertical one at the national level with several institutions either directly or indirectly managed by the MBDC. The majority of NTP activities are carried out by project staff and consultants recruited specifically by the MBDC, and form the backbone of the project at this stage. Staff and available infrastructure at the divisional and district level are minimally involved in the NTP. However, there is the potential to involve these staff in the sector wide approach proposed in HAPP-5. This will ensure ownership of the programme at these levels, and consequently the sustainability of TB control measures. Urban TB control and further involvement of TB hospitals/TB clinics in the NTP are issues that need to be urgently addressed.

Recommendations

1. The NTP should maintain existing project staff and consultants, at least until the year 2000, to ensure continuity of present services and build capacity at divisional, district and thana level
2. The NTP should gradually train and utilize revenue staff at all levels in order to increase ownership and ensure sustainability of services.

3. The NTP should transfer LTCAs and POs from NGO supported thanas to needed areas.

4. THCs should involve Union Sub-centres and FWCs for DOTS implementation.

5. The NTP, in collaboration with all stakeholders, should develop a strategy and plans for TB control in urban areas.

6. The NTP and DGHS should jointly determine the future role of TB hospitals and TB clinics.

**Budget and Expenditure**

The total cost of the TB/leprosy component of the FPHP was approximately US$ 27 million. Due to delays in project implementation and subsequent under-utilization of funds, the GoB revised the project pro forma in 1996. The total cost of the project in this revision was estimated at $ 17.2 million. Cumulative expenditure as of June 1997 was $ 11.5 million (64% of estimated). The funds allocated for 1997-98 are $ 4 million, of which it is estimated that $ 3.2 million is likely to be spent by the end of FPHP. Approximately, 60% of this amount represents the TB related portion of the budget and expenditure. The large components of the project included: drugs, project staff, salaries and allowances, technical advice and consultants, equipment and furniture, vehicles and maintenance, fellowships, printing and stationery, health education and training. These additional costs for implementing the project, which has so far benefited 150,000 patients, is approximately US$ 40-45 per patient treated. These are approximations (salary costs of revenue staff and budgets of NGOs are not included) and need to be further evaluated.

In preparation for HAPP-5, the estimated total budget for the period 1998-2003 is about $ 30 million, of which 28.5% will be GoB contributions and the rest from development partners. In the proposed health and population sector strategy for HAPP-5, a reorganization of the health service, with restructuring and institutional arrangements are expected to take place at the central, divisional, district and thana levels. At the thana level and below, an essential services package (ESP) will be developed to provide client centered one-stop shopping of primary health care services. Within the ESP, the top priority among communicable disease control is TB. In order to effectively support the implementation of the ESP, a high level committee is preparing the plan on the organization and management restructuring of health and family welfare sectors. It is envisaged that TB and leprosy services will be a sub-component under one umbrella project, Primary Health Care and Disease Control. Other projects will be Family Planning, Human Resource Development and Logistics. The funding mechanisms for these projects are not clear. As the high level committee has not yet finalized the reorganization/restructuring plan, it is likely that HAPP-5 will be postponed. In the meantime, GoB may seek funding from WB (adaptable lending instrument) for an emergency package consisting of highly focused vital projects, up to a sum of US$ 30-40 million. TB and Leprosy will be viewed by WB as a high
priority in this package. It was also suggested that supplies of drugs, vehicles, equipment and supplies be procured during the FPHP for an additional year.

Recommendations

1. The NTP should order at least one additional year's supply of medicines, supplies, equipment and vehicles within the next two months

2. The GoB should make a request to the World Bank for funding for an emergency package of services which includes TB and Leprosy, to cover the period between FPHP and HAPP-5. (Continuation of project staff, technical assistance and consultants should be a priority in this package, as they form the backbone of the project.)

Diagnostic Services

Observations

The four teams visited about 40 laboratories in the six divisions of Bangladesh, in GoB and NGO supported centers. Although the quality of the laboratories varied across the country, in general, they were performing well. Supplies were adequate, and most laboratories had an electric or light binocular microscope. Laboratory registers were maintained well, and the laboratory workers were well trained. The overall quality of smearing and staining was satisfactory. Most suspects had three smears recorded in the laboratory register, and positive suspects usually had two positive smears. In Khulna and Barisal divisions, 92% of negative suspects had three smears recorded in the laboratory register, and 86% of positive suspects had at least two positive smears. The proportion of suspects who were smear positive ranged from 5% to 30% but was generally 10-15%. Occasional falsification of records was detected, for example, one smear being done, but three results recorded. Quantification of the bacterial load was usually recorded. There were very few pre treatment defaulters (lost between the laboratory register and the TB register).

Supervision of the laboratories is generally inadequate, and maintenance of equipment is minimal. As a result many microscopes are affected by fungus, particularly those supplied before 1993. Disposal of waste was satisfactory, usually by burning.

The marked gender difference in case finding was also reflected in the examination of suspects, but not to the same extent. Of 1,936 suspects reviewed from laboratory registers in Khulna and Barisal divisions, 1,166 (60%) were male and 770 (40%) were female. Amongst the male suspects, 146 (12.5%) were sputum smear positive, whereas only 59 (7.7%) of the female suspects were smear positive. These results suggest that although access to health services may contribute to the gender difference observed in case finding, it is not the only determinant.

The proposed National Reference Laboratory in the Shyamoli TB Clinic, is under construction and will be completed by April 1998. Initially it should develop culture and drug susceptibility testing, and later conduct drug resistance surveillance.
The heterogeneous distribution of quality of work in the laboratories visited may be related to the following factors:
- the time interval since the introduction of the NTP
- lab support and supervision by GoB or NGO
- geographic factors (e.g. transport)
- motivation of health workers, laboratory staff and supervisors

Supervision of laboratory aspects of the programme could be improved considerably by training the existing supervisors in laboratory evaluation.

Supervision and Quality Control

Regular supervision and cross checking of smear examinations is essential to maintain the quality of the laboratory network. Although quality control systems were initially included in the early years of the project, it was not possible to sustain them as the NTP expanded rapidly. Limited cross checking of smears for some thanas is currently carried out by Shyamoli and Chankarpool TB Clinics. The NTP has not yet utilized the laboratory technicians in the Civil Surgeon’s and Divisional Director’s Offices, who are presently doing cross checking of malaria smears only.

There are basically three possibilities for establishing systematic quality control of smear examinations:

a) A proportion of positive smears, and a proportion of negative smears - from THCs and TB clinics - are re-read at the district laboratory level.

b) The district laboratory level prepares simulated specimens/smears, or uses smears from their own routine work. These are then sent to the periphery for re-reading.

c) A laboratory technician from laboratory A comes for 1 day to laboratory B, and re-reads all smears (e.g. 1 month load); meanwhile, the lab technician from lab B does the same in lab A. This system is only suitable for centres having at least 2 trained laboratory technicians.

The experience from several places, particularly from Damien Foundation areas, showed a considerable fading of unequivocally positive smears with humidity and temperature (see Annex 5). It is possible that, with a high relative humidity and a temperature above 40°C there may be a considerable fading of stained bacilli even after one week of storage. This suggests that smears should be restained before cross checking.

There are a considerable number of private labs in Bangladesh, many of which do smear examinations. In the future, the NTP will need to consider ways of ensuring the quality of smear examinations in these laboratories is also maintained.

Conclusion

A laboratory network for the NTP has been established through the THCs and TB clinics. It is generally functioning reasonably, but requires strengthening through supervision and quality control. Involvement of divisional and district level staff from
the Divisional Health Directorate and the Civil Surgeon's Office will be essential. There is a need to rapidly develop a National Reference Laboratory for the NTP.

Recommendations

1. The NTP should train existing consultants and supervisors in laboratory aspects of TB control (including quality control of smear microscopy) and prepare a checklist for laboratory supervision. Laboratory supervision should be included in all supervisory visits.

2. The NTP should develop a system for quality control of smear microscopy and conduct training for cross checking of slides for district and divisional laboratory technicians. Technical support from WHO to develop a plan and protocol for quality control could assist in this process.

3. The NTP should develop the laboratory at Shyamoli TB clinic as a National Reference laboratory for the TB

4. The NTP should develop a system for maintenance and replacement of malfunctioning microscopes

Treatment and Case Management

Observations

The unit of management for DOTS implementation is the Thana Health Complex (THC), or equivalent NGO facility, serving a population of approximately 250,000 people. Treatment delivery to confirmed cases of tuberculosis is generally provided at THCs or through trained peripheral health workers, community volunteers or village leaders at community level. The aim is to provide free treatment as close to the patient's home as possible through innovative methods of directly observed treatment to ensure that patients complete their full course of treatment and are cured. The extensive network of THC's, union sub-centres and peripheral staff provides excellent opportunities for provision of directly observed treatment to the vast majority of the patients, and it was observed that almost all patients received treatment within 3 days of diagnosis.

Most smear-positive patients treated at the THC's where the revised NTP has been implemented are placed on the short course regimen 2EHRZ/6HT, and were regularly monitored while on treatment through sputum microscopy. However, many TB clinics use unsupervised Category 3 treatment (2EHZ/10HT) for new smear positive patients who are unable to attend daily for DOT. This regimen is inadequate, and these patients should be referred to their nearest THC for supervised Category 1 treatment, as TB clinics have very few peripheral health workers who can provide DOT and retrieve defaulters.

A total of 158,098 patients have been registered in the project since its inception, of whom 51,021 were sputum smear-positive. The table below provides a breakdown of
case finding by year, institution and infectiousness. Majority of patients detected at
THCs were sputum smear-positive (GoB 58% and NGOs 81%), while more smear-
negatives are diagnosed at TB clinics of whom only a small proportion receive DOTS.

Case finding November 1993-September 1997

<table>
<thead>
<tr>
<th>YEAR</th>
<th>GoB thanas</th>
<th>NGOs thanas</th>
<th>TB clinics</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total cases detected</td>
<td>Smear+</td>
<td>Total cases detected</td>
<td>Smear+</td>
</tr>
<tr>
<td>1993</td>
<td>73</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>2 263</td>
<td>1 643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>9 431</td>
<td>5 231</td>
<td>4 556</td>
<td>4 016</td>
</tr>
<tr>
<td>1996</td>
<td>16 256</td>
<td>8 992</td>
<td>8 897</td>
<td>7 571</td>
</tr>
<tr>
<td>1997</td>
<td>14 657</td>
<td>8 297</td>
<td>10 848</td>
<td>8 187</td>
</tr>
<tr>
<td>TOTAL</td>
<td>42 680</td>
<td>24 230</td>
<td>24 301</td>
<td>19 774</td>
</tr>
</tbody>
</table>

The teams analysed data from TB registers for 4,241 patients from 3-month cohorts
registered in the same periods of 1995, 1996 and 1997 (data presented in the 4 tables
below. See Annex 6 for detailed data collected by the 4 teams). The records and
registers were well maintained, and it was possible to easily retrieve information.
Reviewing the laboratory and thana TB registers, it was evident that there were very
few primary defaulters, i.e. smear-positive patients diagnosed in the laboratory but not
registered in thana TB register. Secondly, delay in initiating treatment was minimal,
i.e. most patients started treatment within 3 days of diagnosis. Thirdly, the majority
of patients were evaluated regularly for sputum smear conversion, and final treatment
outcome. Analysis of case finding cohorts from the same quarters of 1996 and 1997
showed that 52% and 66% respectively of new pulmonary patients were smear-
positive, indicating that priority is given to identifying infectious cases. Analysis of
cohorts of new smear positive patients registered in 1996 and 1997 demonstrated 2-
month smear conversion rates of 89% and 90%. Successful outcome of treatment
(cure and completion rates) was recorded in 85% and 84% of new smear positive
patients registered in 1995 and 1996 respectively. These excellent 2-month smear
conversion and treatment success rates clearly demonstrate the effectiveness of DOTS
in Bangladesh.

Patient Records Reviewed

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>496</td>
</tr>
<tr>
<td>1996</td>
<td>2 059</td>
</tr>
<tr>
<td>1997</td>
<td>1 686</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4 241</td>
</tr>
</tbody>
</table>
Case finding

<table>
<thead>
<tr>
<th>Year</th>
<th>New PTB</th>
<th>New smear+ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1,004</td>
<td>520 (52)</td>
</tr>
<tr>
<td>1997</td>
<td>1,080</td>
<td>712 (66)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,084</td>
<td>1,232 (59)</td>
</tr>
</tbody>
</table>

Sputum conversion

<table>
<thead>
<tr>
<th>Year</th>
<th>Evaluated</th>
<th>Smear- (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>523</td>
<td>466 (89)</td>
</tr>
<tr>
<td>1997</td>
<td>606</td>
<td>546 (90)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,129</td>
<td>1,012 (90)</td>
</tr>
</tbody>
</table>

Treatment Success

<table>
<thead>
<tr>
<th>Year</th>
<th>Evaluated</th>
<th>Success (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>496</td>
<td>423 (85)</td>
</tr>
<tr>
<td>1996</td>
<td>532</td>
<td>446 (84)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,028</td>
<td>869 (84)</td>
</tr>
</tbody>
</table>

Issues

(a) Supervision of treatment

The national policy of supervised treatment is not being strictly implemented. In some THCs the intake of medicines by patients is strictly supervised by a health worker. However, in many places, medicines for 3-14 days are given to the patient to take at home. In some places health assistants are instructed to visit the patients to check drug intake or patients are instructed to visit a union sub-centre or health assistant. In general, union sub-centres are rarely used for treatment supervision. It was estimated that 30-40% of patients receive supervised treatment by a health worker. In particular in areas where self-administration of short course chemotherapy is practiced few attempts have been made to use alternative ways, as defined in the NTP guidelines, for provision of supervised treatment to patients who cannot attend a THC daily.

The TB clinics reported 13,385 new smear-positive patients during 1996. Of these only 3,077 (23%) were placed on directly observed treatment. TB hospitals admit patients for supervision of treatment, however, this could be done on an ambulatory basis at their nearest centre.

(b) Categorization of patients

Sputum smear-positive patients who are unable or not willing to attend daily for DOTS are offered the option of the Category 3 regimen. This was observed in TB clinics and some THC's. In some TB clinics this resulted in 75% of sputum smear-positive patients taking a sub optimal treatment regimen.
History of previous treatment is inadequately assessed, and as a result very few previously treated patients are identified and treated with Category 2 regimen (2%). It was widely observed that some patients placed on the category 1 regimen had been misclassified as new, and should have been given the Category 2 regimen.

Patients weighing 50 kg or more were often undertreated.

(c) Sputum conversion

Sputum conversion results in new smear-positive patients placed on DOTS and non-DOTS during the period 4th quarter 1993 to 2nd quarter 1997 are as follows:

<table>
<thead>
<tr>
<th>Treatment units</th>
<th>No. of patients</th>
<th>% Smear-negative</th>
<th>% defaulters</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC's DOTS</td>
<td>36,099</td>
<td>86</td>
<td>4.5</td>
</tr>
<tr>
<td>TB clinics DOTS</td>
<td>5,916</td>
<td>79</td>
<td>13</td>
</tr>
<tr>
<td>TB clinics non-DOTS</td>
<td>19,404</td>
<td>79</td>
<td>15</td>
</tr>
</tbody>
</table>

Results in patients treated at the THC's are better than for those treated at the TB clinics, where treatment delivery is often further from their homes and where there are no field workers for defaulter tracing. A striking finding is that the sputum conversion results for patients treated at the TB clinics are similar for those treated with DOTS and with non-DOTS, although defaulters with non-DOTS are higher. The proportion of defaulters increases further as seen in the final treatment outcomes.

It was noted that in many GoB THC's the sputum conversion rate was reported as 100%, suggesting that follow up smears are being examined inadequately.

(d) Treatment outcome

The reported results of treatment among new smear-positive patients who were placed on DOTS during the period 4th quarter 1993 to 3rd quarter 1996 are as follows:

<table>
<thead>
<tr>
<th>Treatment units</th>
<th>No. of patients</th>
<th>% Cured</th>
<th>% Treatment Completed</th>
<th>% Treatment success</th>
<th>% defaulters</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC's DOTS</td>
<td>14,271</td>
<td>76</td>
<td>4</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>TB clinics DOTS</td>
<td>2,359</td>
<td>61</td>
<td>12</td>
<td>73</td>
<td>18</td>
</tr>
<tr>
<td>TB clinics non-DOTS</td>
<td>9,702</td>
<td>47</td>
<td>13</td>
<td>60</td>
<td>35</td>
</tr>
</tbody>
</table>

Of the patients placed on DOTS during 1995 and the first 6 months of 1996 in the THC's and TB clinics, 6% were reported to have defaulted at the end of the intensive phase of the treatment and 9% at the end of the treatment. The findings for THC's were 5% and 7% at the end of the intensive phase and the end of treatment respectively and 13% and 18% for TB clinics. In addition to the substantial differences between THC's and TB clinics, these data also show that most defaulting occurs during the first 2 months of the treatment.

During the field visits substantial differences in the treatment success rates were observed, ranging from 36% to 91%.
(e) Defaulters tracing and lost patients

Although the policy for tracing of defaulters is described in the NTP manual, specific operational guidelines are not given, and systematic tracing is generally not carried out. Staff to conduct tracing of defaulters are lacking, particularly in municipal areas, and no transport is provided.

Many patients attend the TB clinics for diagnosis and are then referred to urban clinics or to the THCs. There is no system for ensuring that referred patients are registered and start treatment. In two districts of Rajshahi, an excellent system for referral and transfer of patients between the TB clinics in Bogra and Pabna and THCs has been developed. This system could be a model for other parts of the country.

(f) Private practitioners

Estimates of the proportion of TB patients diagnosed and treated by private practitioners vary, but it is probably at least 40% in most parts of the country. The number of these patients completing treatment is unknown. Many private practitioners interviewed did not know about the NTP, and do not follow NTP treatment policies.

Conclusion

All thanas are following the standardized treatment regimens in accordance with national policy, and patients are regularly monitored during treatment. The average sputum smear conversion and final treatment outcome results are excellent, although there is considerable variation between thanas.

Primary defaulters were very few, and delay in initiating treatment of the diagnosis was minimal. (Some district TB clinics and hospitals are not following NTP treatment guidelines). The defaulter rate from district TB clinics is much higher than from thanas. Operational guidelines for defaulter chasing and referral/transfer of patients need to be developed.

Improvements must be made in categorization of patients in terms of previous history of treatment, and in expanding supervised delivery of treatment with involvement of sub-centres, private practitioners and other innovative methods.

Recommendations

1. Supervised treatment should be provided to all smear positive patients by increasing the number of treatment delivery points within a thana, such as union sub-centres, family welfare centres, and health assistant's houses. This will lead to a reduction in the number of smear positive patients given Category 3 treatment, and further reduce the default rate.

2. The NTP should emphasize the importance of adequate history taking to identify previously treated patients, in training programmes and on supervisory visits.
3. The NTP should focus assistance to THCs which are not achieving satisfactory treatment results through supervisory visits.

4. TB clinics should only treat patients from the municipality and should refer all other patients to their nearest treatment facility.

5. The NTP should develop specific operational guidelines for late patient tracing and for referral/transfer procedures.

Recording, Reporting and Monitoring

Observations

All THCs and TB clinics use the NTP recording and reporting system. Records and reports generally were of a high quality, though some deficiencies have to be corrected. The TB hospitals and segregation hospitals do not report at all at the moment, leading to an underestimation of early mortality. Missing reports occur, and there is at times a poor correlation between the different reports on the same cohort. There were numerous small errors, such as misclassification of type of disease or cohort to be reported, because the paramedicals maintaining the registers and preparing the reports have not been sufficiently trained. Other factors responsible for these errors might be the non-availability of the revised version of the Technical Guidelines in many centres visited, and the fact that registers and report-forms are in English. Occasional serious errors of recording were found, for example failure cases had been hidden. This might be explained by an inappropriate insistence on targets set, and supervision by the book rather than problem-solving oriented supervision. Supervision of recording and reporting should aim at obtaining reliable information, rather than perfect results. This implies motivating people not to hide the problems, but rather to explain the causes so that a solution can be found.

There is no system for quality control of reports. Supervision does not include a verification of the reported figures and there has been insufficient analysis and no feedback on the reported figures. None of the centres visited had received any feedback from the central level, and the reports have not been used for corrective action. The data are only being compiled and analysed at central level; the district level generally does not take part in this.

A dual system of reporting exists. The NTP only needs the internationally used cohort reports since they give information that allows programme monitoring and evaluation. However, the DGHS requires non-cohort information on TB in the monthly disease profile report. This has created some confusion.

The sputum conversion report does not include a column for “smear not done”, so these patients cannot be reported. Similarly, there is no provision for extra-pulmonary patients in the report on results of treatment. Since the diagnosis and outcome of extra-pulmonary TB are difficult to ascertain, it is not necessary to add these cases to the results of treatment report, neither should there be a special report on them. They can always be evaluated separately from the registers by those taking a special interest.
Conclusion

The NTP reporting system is in use in all THC's and TB clinics, and is well maintained. Minor errors could be detected and corrected by better training and supervision. There is no feedback system of reports received at the central unit, and the value of reports as a management tool for improving performance has not been fully appreciated.

The present recording and cohort-reporting system provides the essential information needed for monitoring the NTP. It is essential that the present system be preserved in its entirety within the integrated RMIS that may be developed as part of PHAPP-5. It is not possible to efficiently monitor the NTP using information obtained from monthly activity reports.

Recommendations

1. All institutions treating TB patients should take part in the NTP recording and reporting system. Efforts should be made at the district level to register and report all patients. District supervisors should check the reports on their completeness, correlation with earlier reports on the same cohort and plausibility, before sending them on.

2. LTCs and other paramedicals responsible for maintaining of records and for reporting, should receive more practical training by the district supervisors on these issues. This should be followed up during supervision by paying special attention to correctness of records and reports, with further on the job training when needed.

3. Recording and reporting materials should be translated into Bengali, to make them easier for use by paramedical workers. A copy of the current edition of the Technical Guidelines should be sent to all centres.

4. At the project headquarters, a cell should be developed for analysis and feedback on the individual reports. Feedback should be given to the districts, with a copy to the Divisional Directors and to the Director PHC. District supervisors should use these analyses for discussion and appropriate action within their respective districts and THC's. The person finally responsible for processing the data at central level should be clearly identified.
**Training**

Development of skilled health staff in NTP is a pre-requisite for successful implementation of the programme. The National Guidelines on Tuberculosis control, the technical guide for tuberculosis by direct microscopy, sputum examination, forms, treatment cards, registers and WHO training modules form the basis for training of staff at various levels. The table below shows the number of staff trained from September 1993 to September 1997.

<table>
<thead>
<tr>
<th>Course</th>
<th>Duration</th>
<th>Trainees</th>
<th>1993</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
<th>1997</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management course</td>
<td>6 days</td>
<td>TPPO and MO (Disease Control) of Thana; Jr. Consultant and MO TB Clinic; MO (Lep); National Consultant.</td>
<td>93</td>
<td>227</td>
<td>142</td>
<td>590</td>
<td>294</td>
<td>1,146</td>
</tr>
<tr>
<td>Orientation course</td>
<td>1 day</td>
<td>Divisional Director (H), Civil Surgeon, Deputy Civil Surgeon Medical Technologist (Lab)</td>
<td>10</td>
<td>18</td>
<td>40</td>
<td>-</td>
<td>44</td>
<td>112</td>
</tr>
<tr>
<td>Laboratory Course</td>
<td>6 days</td>
<td>Sanitary Inspector, Health Inspector, Medical Assistant, Statistician, District Store Keeper</td>
<td>29</td>
<td>66</td>
<td>79</td>
<td>112</td>
<td>115</td>
<td>401</td>
</tr>
<tr>
<td>Mid-level Supervisors course</td>
<td>2 days</td>
<td></td>
<td>42</td>
<td>326</td>
<td>1,617</td>
<td>1,171</td>
<td>954</td>
<td>4,110</td>
</tr>
<tr>
<td>Field-level Supervisors course</td>
<td>1 day</td>
<td>Aas. Health Inspector, Health Asst., Thana Store Keeper</td>
<td>220</td>
<td>2,007</td>
<td>14,842</td>
<td>2,457</td>
<td>4,173</td>
<td>23,699</td>
</tr>
<tr>
<td>Orientation course</td>
<td>2 days</td>
<td>Junior Consultant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>138</td>
<td>138</td>
</tr>
<tr>
<td>Orientation course</td>
<td>3 days</td>
<td>Programme organizer, Leprosy &amp; TB Control Assistant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Orientation course</td>
<td>2 days</td>
<td>Pharmacist, Lady Home Visitor, Asst. Nurse TB Clinic</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>394</td>
<td>2,644</td>
<td>16,720</td>
<td>4,130</td>
<td>5,878</td>
<td>29,766</td>
</tr>
</tbody>
</table>

At the central level there are 3 medical officers (TB/Leprosy) designated as trainers responsible for conducting training of management and other courses of central, divisional and district staff. The Junior Consultant of TB clinic and Medical Officer (TB/Leprosy) at the district level assist in conducting training courses at divisional and district level, and the Thana Health and Family Planning Officers and Thana Medical Officers (Disease Control) assist in conducting field level courses at thana level. The laboratory courses are held at the central level supported by junior consultant (laboratory) and other trained laboratory technologists. The training of NTP was implemented as per expansion of DOTS in the country. So far 88% of the country has been covered with training on the NTP. The training programme for all THCs in the country will be completed by June 1998. The NTP should now conduct training of private practitioners, village doctors, and others partners in order to involve them in TB services and thus increase case finding and proper case management.

A number of staff from various levels (central, divisional, district and thana) have received international study tours through fellowships. Selection criteria for these fellowships are not clearly defined. In the future, these international study tours should be utilized as incentives to reward good performance. Furthermore, appropriate individuals should be trained in TB control courses conducted annually by WHO SEARO in Kathmandu.
The accompanying table lists the international TB staff who visited Bangladesh during the past 3 years to learn from experiences of DOTS implementation in the country. In the future, training of international staff could be organized systematically twice a year, coordinated through WHO.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>2</td>
<td>1</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Nepal</td>
<td>1</td>
<td>12</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Pakistan</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Thailand</td>
<td>4</td>
<td>5</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12</td>
<td>18</td>
<td>18</td>
<td>48</td>
</tr>
</tbody>
</table>

The total number of various cadres of health manpower trained for the programme from August 1993 till September 1997 is 29,766. Despite this achievement, some constraints in human resources development were identified: (a) practical field visits to model THCs implementing good programmes were not included in the training; (b) considerable attrition of trained staff, requiring continuous training programmes for the new staff as well as refresher courses for existing staff; (c) lack of training materials in Bengali particularly for LTCAs and health assistants; (d) international study tours and training courses were not always targeted to the most appropriate individuals; (e) very little evaluation of the quality of training has been done.

Conclusion

The NTP has conducted extensive training of various cadres of staff within a short period of time. This has enabled expansion of DOTS in the country. The NTP should now aim to improve the quality of training through refresher courses and on-the-job training to staff in poorly performing areas. In the future, training should be targeted to involve private practitioners, village doctors and other partners. Bangladesh has the potential to share their experiences on DOTS implementation to neighbouring countries in the region.

Recommendations

1. The NTP should evaluate the effectiveness of training courses and include practical demonstration of DOTS implementation in model THCs.
2. The NTP should develop a plan for training of new staff, private practitioners, village doctors and other partners as well as refresher training of existing staff.
3. The NTP should develop training materials for LTCAs and HAs in Bengali.
4. GoB and WHO should organize field training on DOTS implementation for international staff twice a year.
Supervision

Observations

The review teams noted wide variations in the quantity and quality of supervisory visits. In some thanas, supervisory visits from district, divisional and central level were virtually nonexistent, whereas in others, the active involvement of district and divisional staff in supervision was clearly evident. Divisional Directors and Civil Surgeons should be encouraged to involve the relevant NGOs and other potential partners in monitoring TB control activities. Supervision from the central level was infrequent, and usually by project staff (non revenue) only. Factors contributing to the quantity of supervision appeared to be the availability of transport, the accessibility of the thana, and the motivation of the district/divisional staff.

Even in districts where supervision was taking place on a regular basis, it was still common to find many errors in the recording system, and deviations from NTP policies, indicating that the quality of supervision could be further improved. In particular, supervision of laboratories was inadequate. Training of supervisors on laboratory aspects of the programme will solve this problem.

A system of planned, systematic supervision, utilizing checklists, does not appear to be in place. A checklist for supervision exists, but is not systematically used and reported. As a result there is little effective feedback to the district and divisional levels. The NTP should utilize the supervisory check list and report during visits to THC's and TB clinics. These check lists should always be used when central, divisional and district staff make technical supervisory visits. The report submitted to the centre visited, with a copy to the CS should be used as a management tool.

Considering the general lack of high quality supervision, the performance of the LTCAs and other staff directly involved in the NTP was remarkably good.

Conclusion

Supervision is generally irregular, unplanned, of suboptimal quality, and dependent on project staff paid from the development budget. A major limiting factor is the lack of transport facilities at the divisional and district levels. Supervision of laboratories and feedback from supervisory visits are inadequate.
Recommendations

1. The NTP should develop a plan for systematic and regular supervision and ensure that central level staff conduct supervisory visits in accordance with this plan.

2. The NTP should train additional supervisors at the central, divisional and district level. These could include the following:
   - Central Level: Deputy and Asst Directors of Disease control from Primary Health Care, Deputy Director MBDC, Asst Director MBDC
   - Divisional level: Asst Director Disease Control
   - District Level: Deputy CS, MO Disease Control, TB Clinic Junior Consultant
   (Training should include laboratory aspects)

3. The NTP should purchase additional vehicles for supervision from the central and divisional levels.

Logistics

Availability of quality drugs in all health facilities is critical for the project. The NTP has succeeded in ensuring that all anti-TB drugs are present in adequate quantities in all THCs implementing DOTS. In general, no stock outs were reported during the past year in most facilities visited. However, due to delays in requisitions reaching the central unit from some districts, lack of drugs was observed in these areas, particularly the Chittagong division. It was noted that pyrazinamide was out of stock for a period of 2-3 months in 1997. This was solved through an emergency purchase locally. These occurrences could be avoided by better planning for drug procurement (early tender procedures, clearance and distribution systems) and appropriate storage with adequate buffer stocks at various levels.

Drug requisitions are placed every quarter by THCs based on the number of patients in previous quarter, stocks remaining at the end of the period and including a three month buffer supply. In several instances, quarterly requisitions are not based on quarterly report on case finding, but on a random basis. Requests from THCs are collated by the district and then sent to the central unit. Supplies are received from the central unit to the district store every quarter, from where distribution is done to THCs. It was noted that the district stores do not store anti-TB drugs but act only as distribution centres. This system operates well and THCs and some NGOs collect their drug supplies from the district stores. Although the Divisional Directorate is not involved in this process, this is the preferred system and seems to function well. The exception to this system is the case of some NGOs, few THCs and district TB clinics, who receive their supplies directly from the central unit. In order to ensure ownership of services and future sustainability, it is recommended that all drug supplies should utilize the district CS office for distribution and a three month buffer stock of anti-TB drugs should be kept at the district stores.

Procurement is done by the central unit through international competitive bidding and tender procedures. Drugs are stored at Shymoli clinic and then distributed by the central unit to district stores (and to THCs in some cases). It was noted that the TB hospitals purchase anti-TB drugs locally from their own budgets. The DGHS should review this matter and prepare a plan for single procurement of quality drugs for the
entire country. Control of drug quality is the responsibility of the Directorate of Drug Administration (DDA). Records on systematic quality control of anti-TB drugs were not available, although some sporadic checks are undertaken by the central unit. In the future, it would be crucial to ensure systematic quality testing of anti-TB drugs and also bioavailability testing when fixed drug combinations are introduced. Presently, only single formulations of anti-TB drugs are utilized in the programme (except ThI). As treatment delivery is supervised by minimally trained health workers the possibility of mistakes increases. This could be prevented by pre-packaging medicines into daily portions. The NTP should consider the introduction of fixed dose combinations (FDCs), particularly RH, in the future.

A major issue faced by the NTP is a solution for expired drugs and those that are due to expire soon. The present problem is a large stock of TH (25 million of which are expired). The reasons for this are: (a) initial procurement of drugs were based on a prevalence of 5 cases per 1000 population estimated in early 1990s, which was an over estimate particularly of non-DOTS patients; (b) delay in project implementation of almost 2 years; (c) low case finding in the project areas and generally throughout the country, (d) DDA has placed an expiry of three years for TH. As TH is a chemical compound and remains stable for many years, its potency was tested in local as well as external laboratories (Thailand, Singapore and Denmark). All laboratories have established that these drugs are still potent and can be safely used. The scientific evidence for the validity of the drugs are available; however, ethical, political and legal implications need to be taken into consideration by the DGHS as soon as possible and a decision should be made urgently. Likely possibilities are (a) DDA could authorize re-validation of existing TH; (b) DDA could authorize district pharmacies to re-package the drugs in new containers; (c) local manufacturers could re-formulate the tablets and assign new expiry dates. As TH was procured from Indian suppliers, option (c) is not possible. Therefore, Director MBDC should discuss with DDA and DGHS to decide on a solution in this matter.

As in the case of drugs, all other supplies, equipment and forms, registers, manuals and stationery need to be procured and supplied to all THC and districts. A plan of implementation needs to be developed and monitored by the central unit. In the plan, the maintenance of existing equipment (such as microscopes) should be included.

In HAP-P-5, it is understood that their logistics will be included in the health sector strategy as an umbrella project. In this case, the NTP should closely monitor discussions of HAP-P-5 and ensure that TB supplies are incorporated in this process without compromising the existing plans, particularly for anti-TB drugs.
Transport

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of vehicles allocated in FPHP</th>
<th>No. ordered</th>
<th>No. received</th>
<th>No. in working order (Oct. '97)</th>
<th>This table outlines the present situation of vehicles available for project activities. Two jeeps have been ordered and will probably reach within a few months. Even with this, there is a need for more vehicles that have been damaged and need replacement. In addition the number of vehicles allocated for the project was based on estimates in 1991 when only 4 divisions existed. Today there are 6 divisions and changes have occurred in training, supervision, distribution of drugs and supplies. It was noted that a number of divisional consultants have not undertaken supervisory visits due to lack of transport for several months. Therefore the immediate transport requirements should be urgently assessed and orders for more vehicles be placed within the next month.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick up truck</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Jeep</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Microbus</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td>130</td>
<td>100</td>
<td>100</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td>300</td>
<td>300</td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

A serious problem exists with the disbursement of motorcycles ordered for the project. This first lot of 34 motorcycles were bought on hire purchase schemes by medical officers at district and thana levels at reduced prices (without tax). A second lot of 66 motorcycles could not be disbursed by the project for two years as GoB has not authorized tax exemption for this lot and the model of the motorcycles is not a popular one. As a result these motorcycles have been in storage in Shyamoli clinic occupying space and are gradually deteriorating in condition. The GoB should take a decision on the use of these motorcycles urgently and take appropriate action to disburse them before they rust.

Furthermore, a plan for transport requirements for the next 5 years needs to be developed by the project taking into consideration the proposed health sector strategy in HAPP-5 and the need for integrating TB services within the existing revenue establishment at all levels.

Conclusion

The present drug procurement and distribution system has succeeded in ensuring regular supplies in majority of THCs. However, the system needs strengthening with a common distribution system, adequate buffer stocks and systematic QC. In addition, use of FDCs should be considered in the future. Lack of transport is hindering supervision activities and also drug distribution. In addition the GoB should urgently act on the disbursement of motorcycles and use of TH tablets. The NTP should also take into consideration the plans for HAPP-5 and link all its logistics into the proposed sector wide strategy. In the meantime, the requirements for drugs, supplies, equipment and transport should be developed until end 1999 and orders should be placed before by early 1998.
Recommendations

1. The NTP should discuss with DDA and DGHS (a) to take action on the expired stocks of TH, (b) to introduce FDCs in the essential drug list, (c) to initiate systematic quality control of drugs.

2. The NTP should discuss with DGHS and WB to take action on the disbursement of motorcycles (for instance, tax exemption, attractive hire purchase schemes)

3. The NTP should aim to provide all drugs and logistics through district CS office, and maintain adequate buffer stocks in district stores.

4. The NTP should monitor progress with regard to planning of HALLP-5 and ensure that a continuous supply line for TB drugs and logistics is maintained.

Health Education and Advocacy

Bangladesh has the potential to become the first large developing country to meet the World Health Organization's global TB targets by the year 2000. For this to be accomplished, energetic advocacy efforts will be needed to maintain strong political support for the rapid expansion of DOTS throughout every union in the country. Of equal importance, social mobilization and Behaviour Change Communication (BCC) campaigns should be initiated to help increase case detection.

According to many TB control staff, one of the primary reasons the DOTS strategy is succeeding in Bangladesh is because of the high level of commitment shown to TB control by Bangladesh policy makers. This political commitment — found from the peripheral up to the central levels — has been essential to overcome a wide array of challenges, such as logistical problems caused by floods and political disturbances.

While health workers believe that TB control is already an important national priority, they believe that more could be done to help TB achieve the same level of political support provided to other health problems such as diarrhoea diseases, EPI, population control, vitamin A deficiency and night blindness. They point to the lack of extensive social mobilization campaigns, health education resources and operational research initiatives as indications that even stronger political support for TB is needed.

Social mobilization and health education are especially important. Now that high cure rates are being achieved in many parts of the country, it is necessary to identify strategies which can significantly increase case finding. While treatment success rates of DOTS in Bangladesh are nearing 85 percent, case detection reaches only 25 percent in many DOTS areas.

The reason that more cases are not being detected is likely due to lack of public understanding about the symptoms of TB, and lack of awareness that the drugs for curing the disease are provided for free at THCs. Some TB patients interviewed during the review reported waiting a year or more before seeking treatment for TB, due to ignorance about the severity of their symptoms or worries over the potential costs of treatment. Furthermore, TB services have only recently been introduced at THCs. Awareness of this is increasing, however, general utilization rate of health
services at THC’s was 45% in 1995, and patients still prefer to obtain services from
village doctors, general practitioners and more specialized institutions such as TB
clinics and hospitals. Finally the burden of tuberculosis in the community needs to be
better estimated by prevalence surveys.

The Government of Bangladesh has prepared a number of posters on TB, which are
seen at health services everywhere and has prepared a television spot featuring a local
film star. BRAC has included TB education in their “door to door” community
education strategy. Some local clinics have developed their own flip charts and slide
shows to help educate people about TB. Yet these strategies are very limited,
compared to efforts that have been made to increase public awareness on other health
issues. It was also observed that there is lack of cooperation between the NTP and the
Health Education Bureau. The “World TB Day” should be utilized by the NTP staff
for advocacy on the target group such as policy/decision makers.

It is also possible that stigma still surrounds the disease, discouraging some people
from seeking treatment. There are different opinions on the extent that those with TB
are stigmatized. One TB patient confirmed that her daughter would have a difficult
time getting married if diagnosed with the disease. A health worker observed that
middle and upper-classes actually show the greatest fear of being discovered to have
TB, as it is seen to be a “poor people’s disease.” Other health workers believed that
stigma was steadily decreasing and is not a significant problem.

Conclusion

Many health education strategies are currently in use to inform the public about TB.
This has resulted in reducing the stigma associated with the disease and in informing
the community about the disease and its treatment. However, stigma still exists in
some areas and community awareness about symptoms of TB and availability of free
medication is still lacking, as indicated by low case detection rates. In addition,
sustained advocacy efforts are required to further increase political commitment to
TB, as is the case of other priority programmes.

Recommendations

1. *The Government of Bangladesh Should Conduct an Extensive Multi-Year Health
   Education Campaign on TB*. Consideration should be given to a number of
different means of reaching the primary risk groups for TB. Television, radio,
billboards, posters, mass meetings, presentations in schools and community
meetings, and use of slide shows, videos and flip charts are a few of the media
which should be considered for a public education campaign on tuberculosis.

2. *The NTP should develop messages that are simple, useful and memorable for such
   a campaign*. Campaign messages should help the public recognize the symptoms
of TB, assure them that TB is curable, and inform them that there is no cost for the
medicines. A secondary message could emphasize that the DOTS strategy is being
used to protect the community of TB. For example:
"TB Can Be Cured ... And For FREE!"

"If you are coughing for more than three weeks, it might be TB. Visit your local clinic and they can cure it for free."

"We use DOTS to protect our community from TB. Those who are coughing because of TB are cured here for free."

Additionally, a memorable DOTS logo or symbol would be essential to help create public identification and support for TB control efforts and to serve as a rallying point for social mobilization.

3. The NTP should share health education materials already developed by NGOs and utilize professional publications to disseminate experiences on DOTS to health workers.

4. The NTP should ensure that advocacy activities are conducted at all levels on the occasion of the "World TB Day".

Research

Specific operational research studies are needed to strengthen and support NTP, particularly for effective DOTS expansion and sustainable programme development. There have been a number of studies conducted by various organizations, but there is no inventory of such activities and information on their results is not widely available. There is so far little operational research related to NTP, except the on-going one for urban programme in Chittagong.

Conclusion

Very little operational research is being conducted by the NTP at present. The reasons for this are lack of staff who were primarily involved in DOTS expansion and capacity to develop protocols and conduct systematic research. There is a need to develop an inventory of on-going TB research, prioritize the research agenda and involve other partners in conducting the research. Potential areas of research include:

(a) Epidemiological study/survey: prevalence survey based on sputum examination

(b) Surveillance related study/survey on: drug resistance, drug reactions, quality of supervision, and recording/reporting, sentinel surveillance for HIV in TB patients

(c) Operational research on: quality control of sputum examination, gender differences, disease perception and behavioral change among people, impact of health education and social mobilization campaigns on TB case notifications, and advocacy strategies to promote and sustain interest in TB and communication strategies to educate the public
(d) **Health systems research on:** strategies to supervise treatment delivery and its
cost-effectiveness, collaboration with NGOs, collaboration with private practitioners,
sustainability and integration of NTP within the health and population sector strategy
in HAPP-5.

**Recommendations**

1. *The NTP should establish a committee, including NGOs, professional agencies,
   and academic institutions to prioritize and coordinate TB control related
   research.*

2. *The NTP should contract out the studies to capable groups/agencies.*

**Cooperation with Other Partners**

The NTP has substantial opportunities for developing partnerships with several other
stakeholders. Primary amongst them are Professional Associations, Research
Organizations/Institutions and Academia, policy makers, the media, others in the
health sector such as the Director General of Health Service’s office and the MoHFW,
and also the private and commercial sector. Such cooperation should extend well
beyond the Dhaka Office and be developed at all levels.

The NTP has as one of its strengths its collaboration with the NGOs. The
collaboration is currently with 6 main NGOs, most of whom were involved in
community based treatment and control for leprosy. One of these institutions is a
development organization involved in health service delivery, and in particular,
infectious disease control as a major strategy of development.

This collaboration is based on a memorandum of understanding, whereby the NTP
provides anti-TB drugs, reagents, and chemicals; training of trainers for NGOs with
provision of the training curriculum and modules; a GoB-WHO accepted and
approved treatment regimen; uniform reporting forms and the requirements. NGOs
implement DOTS in accordance with national policy and regularly report to GoB on
their activities. The following positive aspects of this partnership and collaboration
have been observed:

(a) Ensuring greater geographical and population coverage, via the NGOs service
facilities and community based infrastructure. Between themselves BRAC, Damien
Foundation, DBLM, HEED, LAMB, RDRS cover 131 number of thanas, which
approximately accounts for 35% of the 363 THCs where DOTS is now implemented
population.

(b) Respiratory symptomatics are increasingly identified leading to early screening of
sputum positive cases. The NGO community health volunteers or field workers ensure
DOT, treatment compliance and completion on confirmed TB patients.

(c) The reporting from all organizations is uniformly done every quarter in the forms
provided by NTP. This allows easy analysis of NTP’s programmatic performance.
(d) The NTP undertakes to provide supervision through the Divisional Consultants to assess programme performance. The NGOs however determine the operational strategy appropriate to their own philosophy and thinking. This allows the organizations to retain their autonomous functioning while being appropriately accountable to the NTP.

There are however certain areas which need to be strengthened and streamlined. These are the following:

(a) Due to the independent nature of the organizations, coordination with NTP is not optimum at all levels. For instance it was observed that the coordination was effective in the districts while the thana level interaction did not receive the same emphasis. Both the NTP and its NGO partners should work towards increasing coordination and improved liaison with the thana level government health functionaries.

(b) The TB Clinics and the TB Hospitals are the secondary and tertiary referral centers in NTP. This referral network is not used by some NGOs, who instead use their own hospitals. The referral linkage for NTP needs further streamlining, whereby both the NGO and the government referral institutions should be within a structured referral system and should follow the same guidelines for treatment, and develop appropriate capacity for this referral work.

(c) It was observed that some NGOs use their own recording system. While this system contains all indicators (and some times more) chosen by the NTP, the difference in the system may hamper quality supervision both within the organization and by the Divisional Consultants.

(d) The follow up of all sputum negative cases needs to be ascertained and recorded.

The NTP should broaden its partnership on the basis of its experiences of collaborating with non-government organizations. Presently, the partnership with NGOs is initiated with a Memorandum of Understanding (MOU). This document specifies the role and responsibilities of both parties i.e. the NGO and the NTP, including the geographical coverage, and the recording and reporting coverage. Thus if the signing of the document is delayed work in the field is hampered. The NTP should ensure that these procedures are smoothly implemented.

Appropriate collaboration could be developed with traditional healers, palli chikitsaks (village doctors), and also with private practitioners. It was observed during the field visits that often the first point of contact for health care services is the traditional healers and village doctors. Using these people to ensure compliance to the appropriate treatment regimen and completion, and also ensuring supervised treatment delivery, can be the next success story of NTP. Some NGOs have already started piloting this in the field and the NTP may learn from their experiences.

In addition to the traditional private sector, co-operation and collaboration can be developed with the private physicians and practitioners (especially through the BPMPA) to ensure appropriateness of diagnosis, drug regimes and treatment delivery. Initiating and maintaining channels of communication with the private practitioners may assist in effective referral care and follow-up. The strategy of orientation and
utilization of private practitioners as partners may be a key strategy especially in the urban areas.

The need for strengthening communication and interaction within the NTP was noted by the review team. This would enhance the understanding of the strategy and work plan and faster accomplishment of NTP objectives. Several activities are required to bridge the current gaps in internal communication: (a) share experiences from all the six divisions of the country through frequent (quarterly or biannual) meetings, (b) a NTP retreat on an annual basis to develop a work plan for the coming year along with a review of the accomplishments or failures of the previous year. This exercise will also provide opportunities to share views and experiences and promote greater dialogue among staff.

Conclusion

It was observed that cooperation with the existing partners has developed on the basis of concerted efforts of the NTP. Development of collaboration and cooperation with other stakeholders requires considerable efforts and full time responsibility of some dedicated individuals in the NTP. Internal communications among NTP staff needs to be strengthened.

Recommendations

1. The NTP should ensure continued cooperation and collaboration with existing partners, and develop new partnerships with other stakeholders identified above. A strategy for this cooperation and an implementation mechanism for it should be developed and incorporated in the annual work plan.

2. The NTP should hold an Annual Workshop/Meeting with all partners and stakeholders within and outside the NTP to disseminate information on the NTP's achievements, constraints and problems. This will increase the NTP's partnership base.
Annexes

Annex 1: List of Reviewers

Team 1: Dhaka Division
Dr Jacob Kumaressan, Medical Officer GTB, WHO/HQ, Switzerland
Dr ASM Humayun Faruque, Dy Director CDC, DGHS, Bangladesh
Dr Sadia A Chowdhury, Director Health & Population Division, BRAC, Bangladesh
Prof Richard Urbanczik, Medizinisch Diagnostik Ches Institut, Shiffweiler, Germany
Dr Pierpaolo de Colombani, WHO Medical Officer (TB)
Dr Shaiikh A Shaked Hossain, WHO Divisional Consultant, Dhaka

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Mr K Klaudt - GTB/HQ
Dr A Haque, Asst Director MBDC
Mr S Das Gupta, Health Projects Director, HEED
Dr K Belayet Ali, WHO Divisional Consultant, Rajshahi

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Dr N Ishikawa, Vice Director, Research Institute of Tuberculosis, Japan
Dr Golam Nabi, WHO National Consultant
Dr Rosemary Croft, DBLM
Dr Subrata Chakma, WHO Divisional Consultant, Chittagong
Dr Mirza Nizamuddin, WHO Divisional Consultant, Sylhet

Team 4: Khulna and Barisal Divisions
Dr I Smith, Advisor, National Tuberculosis Programme, Nepal
Dr A Van Deun, Medical Director, Damien Foundation Bangladesh
Mr Mozammel Haque Khan, Senior Assistant Secretary, MoHFW
Dr Nooruddin Ahmed, WHO National Leprosy Consultant
Annex 2: Places Visited and People Met

Team 1: Dhaka
16 Nov Divisional Director's Office, Dhaka
Dr Korom Hussain, Divisional Director (Health)
Anita Rani Das, Asst Director
Abul Hasnat, MO EPF

Office of Director of Drug Administration
Mohammed Abdul Malek, Director Drug Administration

17 Nov Civil Surgeon's Office, Gazipur
Dr Shahriar Rahman MO TB/Lep
Altaf Hossain, Programme Organizer
Dr Saifuddin Ahmed Resident MO, Sadar
Dr Hayat Mahmoob, MO CS's Office
Fulchand Mondol, Lab Technician

Thana Health Complex, Kaliakoir
Dr Md A Halim TH&FPO
Dr Md MA Kasem Resident MO
Dr Md Tauqifur Rahman, MO
Dr Md Shoras Ali, MO
Dr Aftab Khan, MO
Dr Md Anawarul Hoque, D/S
Dr Mohammad Salman, MO
SM Asaduzzaman, Lab Technician
Mr Motaleb Hossain, Lab Technician

18 Nov Trishal THC
Dr Sharaf Uddin TH&FPO Trishal
Dr MA Quasem MO Disease Control
Rowshan Jaman LTCA
SM Asaduzzaman, Lab Technician
Md Motaleb, Lab Technician

BRAC Office, Trishal
Dr Sharaf Uddin, TH&FPO Trishal
Dr Samar Kumar Hore, MO, BRAC
Md J Haque Siddique, Programme Organizer, BRAC
MA Kayum, Programme Organizer, BRAC

Civil Surgeon's Office, Mymensingh
Md Md Abdul Harun Jr Consultant TB
Dr Gulam Mostofa Dy Civil Surgeon
Dr Moshuur Rahman MO CS's Office
Mieke Opsomer, Project Director DF, Mymensingh
Dr Harun Ar Rashid Regional Manager BRAC, Mymensingh
Md Hasan Ali Mia Sr Area Manager BRAC
Mr Kamruzzaman Head Assistant
Md Sahidat Hossain Programme Organizer, CS's Office

Civil Surgeon's Office, Sherpur
Dr ER Chowdhury Civil Surgeon
Dr AKM Shahjahan TH&FPO
Dr Parikhit MO TB/Lep
Dr Habibur Rahman Regional Manager BRAC

Team 3: Chittagong and Sylhet
Dr Nural Anowar, Divisional Director Chittagong
Dr Aminul Islam, Civil Surgeon Chittagong district
Dr Ibrahim Khalilulla, Jr TB consultant Chittagong district
Dr Bhotanath Paul, THFPO Ukhis THC
Dr Mosiul Alam Kutubi, MO TB/Leprosy Ukhis
Dr Md Shahzadul, THFPO Chhandaish THC
Dr Shaheen Hossain, MO TB/Leprosy Chhandaish
Dr Mutia Abdullah, THFPO Satkania THC
Dr Mohammad Ali, MOin charge AbiLalkhan Bazar
City Corporation Charitable dispensary
Dilshub Aze Habib, MO Gansul Azam urban dispensary
D Dr Aparajita Poddar, MO Gansul Azam urban dispensary
Abul Khair Bhuian, Civil Surgeon Comilla district
Dr Tariqul Islam, Dep Civil Surgeon Comilla district
Dr Mahabubul Islam, Jr Consultant TB clinic
Comilla
Dr GM Monshad, MO TB clinic Comilla
Dr Abdul Matin Patwari, THFPO Daundkandi THC
Md Rafiqul Islam, LTCA Daundkandi
Dr Md Abdul Rashid, Civil Surgeon Sylhet
Dr Sirajul Islam, JrTB consultant Sylhet TB hospital
Dr Md Shah Ali, JrTB consultant Sylhet TB clinic
Dr Gouri Rani Das, MO TB clinic Sylhet
Dr Rafiqul Islam, Civil Surgeon Sylhet
Dr Jainta Datta, MO Civil Surgeon office Sylhet
Dr Alok Kumar Podder, Medical Officer TB/L.
HEED, Kamalganj
Dr Md Bashirul Islam, THFPO Kamalganj THC
Dr Alok Kumar Podder, MO Kamalganj THC
Dr Bipul Kanti Biswas, MO Kamalganj THC
Mr Rajendra Koiri, TLCO Kamalganj THC
Ms Salma Aktar Choudhury, TLCA Kamalganj THC
Md Mustafa Miah, TLCA Kamalganj THC
Md Abdul Samad, TLCA Kamalganj THC
Mr Bemu Bhushan Sinha, TLCA Kamalganj THC
Mr Rinku Mitra, TLCA Kamalganj THC
Md Abdur Rahman, TLCA Kamalganj THC
Dr Syeda Badrun Nahar, Civil Surgeon
Srimongal
Dr Husne Ara Begum, THFPO Akhaura THC
Dr Salwar Alam, RMO Akhaura THC
Md Azad Fauque, LTCA Akhaura THC
Dr Haroon Ur Rashid, ex MO TB/Lep Srimongal

Team 4: Khulna and Barisal
16 Nov Jhenaidha District, Khulna Division
Dr Syed Mahafazzal Haque, Divisional Consultant
Dr Sarder Baddruddin, Civil Surgeon, Jhenaidha District

17 Nov Kotchhupur THC
Taziz Uddin Ahmed Head Assistant CS
BRAC Office, Sherpur
Dr Habibur Rahman, Regional Manager BRAC

19 Nov TB Clinic, Mymensingh
Dr Md Abdul Hamid Jr Consultant
Dr Gul Nahar Begum MO TB Clinic
Md Nekbar Ali Lab Technician
Suvash Chandra Shaha Pharmacist
Md Ibrahim Pharmacist
Rezia Khatoon Nurse
Md Zoyaul Abedin Radiographer
Md Abul Kalam Azad Office Assistant

Civil Surgeon Office, Netrakona
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Md Humayun K Salim journalist
Mr Fazul Haque Programme Organizer

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Netrakona THC
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Dr Md Mukshudul Asin MO Disease Control LTCA

DF Hospital, Netrakona
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Mr Satyajit Naha Sr TB/Lep Control Officer

THC, Purlobhola
Dr Giasuddin, TH&FPO
MO Disease Control LTCA

Bangladesh AIDS Prev & Dis Control
Prof Md Nazrul Islam, Project Director

20 Nov Asian Development Bank
Ministry of Local Govt, Rural Development & Cooperation
Mr Md Zillur Rahman, Minister

Ministry of Law & Justice
Adv Abdul Matin Khassu, Minister

Ministry of Finance
Mr Shah AMS Kibria, Minister

MoH&FW
Mr MA Rajid, Joint Secretary WHO Projects

21 Nov Civil Surgeon Office, Dhaka
Dr AKM Fazul Haque Civil Surgeon
Dr ASI Musa Dy Civil Surgeon
Dr Fazul Kabir Rumi MO TB/Lep
Md Nasir Uddin Programme Organizer

Dr Abdul Bashir Md Khoshru, TH&FPO
Mr Md Rezaul Alam, LTCA
Mr Nimai Chandra Biswas, MT
TB patients (6)

Jhanaidha Sadar Thana Health Office
Dr Zabun Nesser Kiatoon, TH&FPO
Dr Sk Md Aminul Islam, MO
Mr Amir Hamiduzzaman, LTCA
Ms Mamuda Jahan, MT

Jhanaidha Sadar
Pharmacies (4)
Dr Benu, GP

Nov 18 Chitadanga District Office, Khulna Division
Dr SM Mustafa Anower, CS
Dr Ekramul Haque, TH&FPO, Chitadanga Sadar TBO

Damurhuda THC
Dr Md A Latif, TH&FPO
Dr Syemur Samad, MO
Mr Md Abdul Jabir Malik, MT (Lab)
Mr Md Abdul Hakim, MT (Lab)
Mr Md Ashraful Islam, LTCA
TB patients (18)

Chuadanga TB Clinic
Dr Md Firozur Rahman, JC
Dr Ratan Kumar Singh, MO
Mr Abu Thaker, MT (Lab)
Mr Md Abdul Rahman, MT (Lab)
MT (Pharmacy)

19 Nov Jessore District, Khulna Division
Dr Sanjil Kr Biswas, CS
Dr Md Hamezamal, Deputy CS
Dr Md Shamsul Islam, MO Leprosy, CS Office
Dr Kadir, JC Jessore TB Clinic

Jhikargacha THC
Dr Farid Uddin Ahmed, TH&FPO
Dr Sk Md Abdus Samad, MO
Mr Md Nazrul Islam, LTCA
Mr Md Shamsuddin Khan, MT (Lab)
Mr Bipasha Halder, MT (Lab)
TB patients (5)

Sharalia THC
Dr Ataur Rahman, TH&FPO
Dr Ashok Kumar Shah, MO
Ms Bina Rani Biswas, MT (Lab)
Mr Md Mozammel Haque, LTCA

Jessore TB Segregation Hospital
Dr Shamsul Zuba, MO

20 Nov Khulna District, Khulna Division
Dr Habipur Rahman Sabuj, CS
Dr Monos Kumar Bose, Acting DCS
Dr Mostafa Nuruzzaman, MO (TB/Lep)
Mr Abdur Razzak Miah, PO (TB/Lep)
Rupesta THC
Dr Anil Krishna Biswas, TH&FPO
Dr Sumit Kumar Biswas, MO
Mr SM Goljar Ahamed, LTCA
Mr Md Rashid, MT (Lab)
Mr Poritos Kumar Roy, MT (Lab)

Khulna Divisional Director's Office
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Dr Md Abul Quashim, Asst Director (Disease Control)

Khulna TB Clinic
Dr Anowerul Azad, JC
Dr ASM Zahirul Hasan, MO
Mr Arun Kanti Kor, MT (Lab)
Mr Md Moin Uddin Gazzi, MT (Pharm)

21 Nov Khulna TB Hospital
Dr Rezina Ahmad Siddique, Senior Consultant
Dr Assadul Haque, MO
TB patients (8)

22 Nov Satkhira District, Khulna Division
Dr Abu Yusuf Miah, CS

Satkhira TB Clinic
Dr Muhammad Mamunur Rashid, JC
Dr Md Anisur Rahman, MO
Mr Robindra Ch Das, MT (Lab)
Ms Niva Mollah, MT (Pharm)
Ms Joynab Akhter, HV
Ms Shirin Nahar, HV

Kaliganj THC
Dr Md Habibullah, TH&FPO
Dr Md Tabibul Islam, MO
Mr Ismatuddin Ahmed, MT (Lab)
Mr Prodip Kumar Roy, LTCA
HA
SHI
TB patients (3)

23 Nov Barisal Division
Dr Md Abdur Rahman, Divisional Director of Health
Dr Maksudur Rahman, Divisional Consultant

Pirojpur District
Dr Bipin Behari Sarkar

Pirojpur Sadar THC
Dr Nani Gopal Roy, TH&FPO
Dr Sukha Ranjan Das, MO
Mr Nur-E-alam Siddiqui, LTCA
Mr K Roy, TLCO, DBLM
Mr Narayan, Lab Technician, DBLM
Mr HC Singh, TLCS, DBLM

Dinajpur district
Dr A Rahman, Civil Surgeon in charge
Dr S A Ahad, Deputy Civil Surgeon
Dr M Begum, MO TB / Leprosy
Dr L Rahman, TB Consultant
Mr A H Choudhury, Senior Regional Manager, BRAC
Dr N Sultana, MO BRAC
Mr Ali Ahmed, Lab Technician, BRAC
Mr B Roy, Sr Area Manager, BRAC
Mr Krishna Chandra Roy, TLCS (Ranishankail)

Lalmonirhat district
Dr S Ahmed, MO Civil Surgeon office
Dr M A Salam, THFPO
Dr S Rahman, Community Health Co-ordinator, RDRS
Mr Md H Islam, Sector Manager (TB & Leprosy)
RDRS
Mr Md S Hoque, Sector Manager (TB & Leprosy)
RDRS
Dr Md A Matin, Asst Co-ordinator (TB & Leprosy)
RDRS

Bogra district
Dr KM Shafiu Alam, Civil Surgeon
Dr Md A Rahman, TB Consultant, TB Hospital
Dr Md F Alam, MO TB/Leprosy
Dr RC Mitra, TB Consultant, TB Hospital
Mr N Islam, Sr Area Manager, BRAC
Dr W Islam, MO BRAC
Dr A Islam, Zonal MO BRAC
Dr T Bose, MO BRAC
Mr N Bhuiyan, Sr Area Manager, BRAC
Mr M Wahiduzzaman, Lab Technician, BRAC

Pabna district
Dr Shamsuddin Mondol, Civil Surgeon
Dr K Rahman, Jr Consultant
Dr Tahsin Begum, MO TB Clinic
Dr Madudur Rahman, MO TB Seg Hospital
Mr A Mannan, PO
Dr Ishaq Ahmed, THFPO, Iswardi
Mr Mohsin Hossain, LCA Iswardi

Rajshahi district
Dr Mijanur Rahman, Divisional Director (Health)
Dr Nazrul Islam, Civil Surgeon
Dr Wasiq Hossain, Jr Consultant, TB Clinic, Rajshahi
Mr Subhas Chandra, Project Director, DF, Rajshahi
Dr Erwin Coormen, Medical Director, DB Rajshahi
Dr Jahurul Islam, TH& FPO, Putia
Dr A Hossain, Supdt TB Hospital
Dr Nuruzzaman, RMO TB Hospital
FADING OF FUCHSINE STAIN

AFB still visible at 30° Celsius

PERCENT REMAINING FROM ORIGINAL READING

WEEKS
FADING OF FUCHSINE STAIN
AFB still visible at 40 degrees Celsius

PERCENTAGE REMAINING FROM ORIGINAL READING

WEEKS

RH 100
RH 87
RH 78
RH 69
RH 60
## Annex 6: Summary of Case Finding, Smear Conversion and Treatment Outcome Data

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**Annex 7: Abbreviations**

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<td>BAPCP</td>
<td>Bangladesh AIDS Prevention and Control Programme</td>
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<td>Behaviour Change Communication</td>
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<td>Bangladesh Medical Association</td>
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<td>Bangladesh Private Medical Practitioners Association</td>
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<td>Chest X ray</td>
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<td>Directorate General of Health Services</td>
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<td>DOT</td>
<td>Directly Observed Treatment</td>
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<td>DOTS</td>
<td>Directly Observed Treatment, Short Course</td>
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<td>Expanded Programme of Immunization</td>
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<td>Essential Services Package</td>
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<td>Family Welfare Centre</td>
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<td>International Development Agency</td>
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